

COAL AGE

Vol. 3

NEW YORK, JUNE 14, 1913

No. 24

True Success

BY BERTON BRALEY

Written expressly for Coal Age

Though Dividends come rolling in
Beyond the dreams of avarice,
The measure of success you win
Is not determined just by this;
For it is Failure, not success,
(However great the golden spoil)
To profit by the harsh distress
Of those who serve you by their toil.

Your house of pride and lordly show
Is only proof of gold and greed
If in the miners' huts below
Are famine, misery and need;
If those who mine your good black coal
Have had no share in all your gain
But labor for a grudging dole,
Then your "Success" is false and vain.

If you are playing fair and square
And giving those who toil their due,
Taking for yours, your honest share
Of what the mine has yielded you,
If no man justly owes you hate
If you have kept your tenderness,
You may not gain a vast estate
But—you will find the true success!

Coking the Semibituminous Johnstown Coals

BY JOHN W. GOCHER*

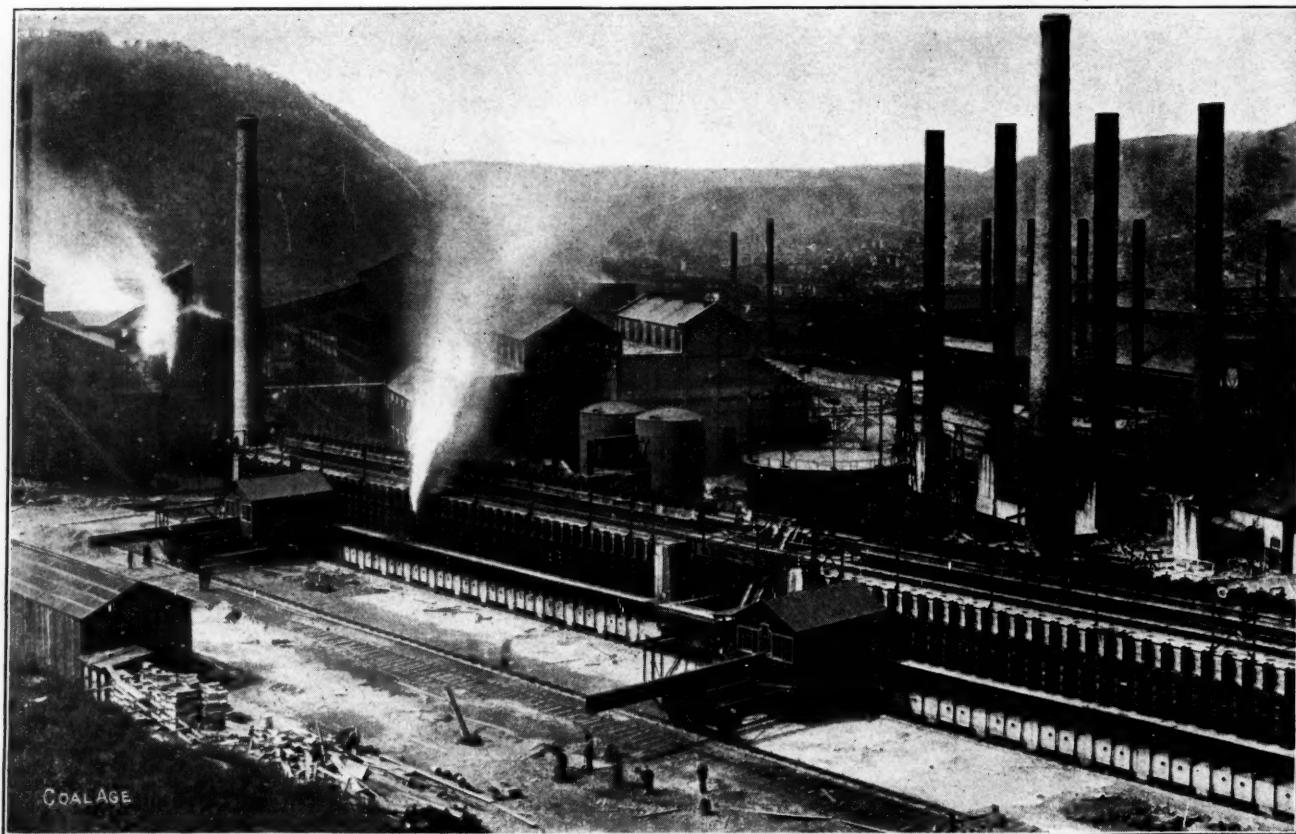
SYNOPSIS—The Johnstown coals will not coke in beehive ovens unless part of the fixed carbon is burned to make heat. They give much trouble because they swell so freely on coking. It has been noted that the coals which expand least are those which are highest above sea level. These also contain the highest volatile content but the indications do not afford sufficient basis for a conclusion as to the cause of the excessive expansion.

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Although classed as a semibituminous fuel, the workable seams of coal in the Johnstown basin may be said to be among the driest of the so called dry bituminous coals.

ning, or Cement, bed, with a few openings tapping the Upper Freeport, or Lemon seam. The topography of this region is so badly broken up that within a comparatively short radius from the center of the city, coal is mined from the same seam in openings varying 200 ft. or more in elevation, and this coal shows markedly different characteristics, with a more or less definite relation between the elevation of the coal and its proximate analysis.

A reference to the Johnstown folio of the Geological Survey will show that the bottom of the basin lies immediately north of the city and for convenience, in the table which is given later in this paper, the elevation of the various workings from which samples were taken is



BATTERIES 5 AND 6, OTTO-HOFFMAN BYPRODUCT OVENS, JOHNSTOWN, PENN., FIFTY OVENS TO A BLOCK

The Johnstown syncline crosses the lower end of the city in a northeasterly direction, and lies between the Laurel Ridge anticline on the northwest and the Ebensburg anticline on the southeast. In the hills surrounding the valley of the Stony Creek, on which the city is located, the workable seams of coal outcrop at numerous points.

APPARENT RELATION BETWEEN ELEVATION AND COKING ACTION

Most of the workings are to be found in two seams, the Lower Kittanning, or Miller, and the Upper Kittan-

given as above sea level, the lower Kittanning bed in the bottom of the basin being approximately 950 ft. above that datum.

THE EARLY COKING METHODS

In the early days of the iron industry at Johnstown, the Upper Freeport coal was coked in heaps or mounds and the resulting product used in the local blast furnaces. The coke is said to have been of fair quality and well suited for use in the small blast furnaces of the time, which were used for smelting the local low-grade self-fluxing ore. More recently various attempts have been made to coke the local coals in ordinary beehive ovens, but with indifferent success, the coking time being 72

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to 96 hr. and great difficulty being experienced in maintaining the oven heats.

At the present time, however, in West Virginia, similar coals are being coked in beehive ovens, but with low yield, a fair percentage of the carbon being used in addition to the volatile matter, to maintain the heat.

The method of coking in heaps at the Cambria plant was followed sometime in the seventies, by a plant of so called "Belgian" ovens, which were operated for several years and abandoned about 1880, when the company acquired coal lands and built beehive ovens in the Connells-ville region. No definite records of these Belgium ovens are now in existence.

COPPEE NONRECOVERY RETORT OVENS

The first retort ovens in which Johnstown coal was used were located at Conemaugh and worked in connection with the Cambria Iron Co.'s blast furnace at that point. The plant consisted of 60 Coppee nonrecovery retort ovens and was built in 1886-1887, and operated

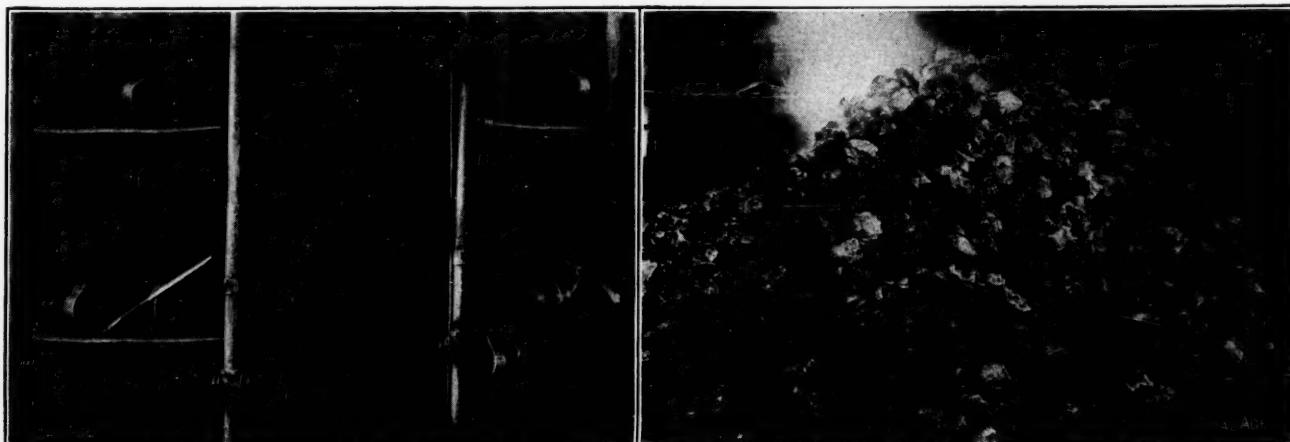
coke had burned itself loose, damage to the oven walls resulted.

THE INTRODUCTION OF OTTO OVENS

The gradual exhaustion of the Cambria Iron Co.'s holdings of first-class coking coal in the Connellsville region led, soon after the flood of 1889, to further investigation of possible methods for coking the local coal, and in 1893 and '94 representatives were sent to Germany to study the various systems of retort ovens. Coal was shipped to some of the German plants and coke made from it.

As a result, a contract was made with the Otto Coke & Chemical Co., the American representatives of Dr. C. Otto & Co., and 60 retort ovens with a plant for the recovery of tar and ammonia, were built at Johnstown in 1894.

This was the first byproduct-coke plant in this country to be built in conjunction with a steel plant and making its principal product for use in a blast furnace. This



APPEARANCE OF RED-HOT COKE IN RETORT BEFORE PUSHING. NOTE HOW TIGHTLY IT FILLS THE OVEN

COKE AFTER BEING PUSHED FROM THE OVEN. IT IS NOT LARGE AND COLUMNAR LIKE BEEHIVE COKE

until the furnace plant was destroyed by the Johnstown flood in 1889, after which it was not rebuilt.

The coal used was the Upper Freeport, containing about 17½ per cent. of volatile matter, and it was crushed before charging, but was not washed. The ovens were 16 in. wide at one end and 20 in. at the other, 5 ft. high and 22 ft. long, and the coal charge weighed three tons. The coking time was 48 hr. and the coke yield 68.7 per cent.

At the outset the usual Coppee practice of working the ovens in pairs was followed, a fresh oven being charged alongside a partly coked one, in order to maintain the battery heat. This did not work satisfactorily and continual trouble was experienced in pushing the ovens.

Afterward the practice was changed, so that the ovens were charged and pushed in rotation, the oven heats probably being maintained by combustion of some of the carbon in the retort, the yield, as noted above, being 68.7 per cent. Efforts made from time to time to reduce the coking time below 48 hr. were unsuccessful, and were finally abandoned.

The operation of this plant gave constant trouble. The coal in coking swelled to such a degree that when the coke was pushed, unless extreme care was used, or the cake of

initial plant is still in service. Additions were made to it from time to time, until at present the installation consists of 372 ovens, all of them practically the same size, with a capacity of 4½ net tons of coke per charge.

As compared with the large units now being constructed, these may seem small, but, until recently, the advisability of adopting larger ovens has been a matter of doubt. It has been questionable whether the "structure" of the coke would be sufficiently strong to withstand the pressures resulting from the swelling of the coal on coking, if that operation were conducted in larger ovens.

SMALL VARIATIONS IN ANALYSIS WITH WIDE VARIATION IN EXPANSION ON COKING

The first plant was built with the intention of using mountain coal from points east of Johnstown, containing a higher percentage of volatile matter and for a time this coal was used.

The possibilities of the local coals were always kept in mind, however, and the practice gradually modified until, at present, only local coal is used, the mixture consisting of half from the Lower Kittanning and half from the Upper Kittanning seams.

This is true, however, of the coal from two openings

only, known locally as Franklin mines Nos. 1 and 2, efforts to use the coal from other mines in the same seams giving trouble.

This fact led, recently, to a systematic investigation of the characteristics of the coal as mined at different points, the results of which are given in Table I.

The results given are fair averages, and if any deduction can be made, it is that the highest volatile content is found in the coal at the highest level in the basin, and also that the degree to which the coal will swell in coking varies considerably with only slight differences in analysis.

An effort was made to trace some analogy between the

TABLE I. RELATION OF ELEVATION AND COMPOSITION TO EXPANSION OF COAL ON COKING

Elevation above sea.	Lower Kittanning—West Side of Stony Creek				Lower Kittanning—East Side of Stony Creek				Upper Kittanning			
	Mine No. 1 1150 Ft.	Mine No. 2 1040 Ft.	Mine No. 3 1350 Ft.	Mine No. 4 1340 Ft.	Mine No. 5 1300 Ft.	Mine No. 6 1250 Ft.	Mine No. 7 1320 Ft.	Mine No. 8 1208 Ft.	Mine No. 9 1470 Ft.			
Coal.	Raw	Washed	Raw	Washed	Raw	Washed	Raw	Washed	Raw	Washed	Raw	Washed
Volatile matter.	15.40	16.34	15.54	15.12	17.37	17.65	17.90	17.73	17.66	17.80	17.53	17.14
Fixed carbon.	76.48	77.53	75.46	79.11	73.58	76.81	72.95	75.79	72.04	76.07	73.35	76.66
Ash.	8.12	6.13	9.00	5.77	9.05	5.54	9.75	6.48	10.30	6.13	9.12	6.20
Phosphorus.	0.012	0.008	0.008	0.007	0.012	0.012	0.010	0.009	0.013	0.011	0.012	0.011
Sulphur.	2.71	1.04	2.56	1.27	2.55	1.00	2.90	1.07	4.06	1.35	4.05	1.48
Silica.	2.52	2.31	2.40	2.39	2.98	1.61	2.96	2.63	2.55	2.50	2.38	2.10
Lime.	0.11	0.10	0.10	0.10	0.08	0.08	0.19	0.13	0.08	0.10	0.08	0.06
Magnesia.	0.11	0.18	0.31	0.43	0.11	0.12	0.21	0.15	0.11	0.21	0.22	0.17
Alumina.	2.10	2.06	3.02	1.35	2.58	2.38	2.40	1.85	1.80	1.98	2.24	2.04
Ferric Oxide.	3.20	1.44	3.08	1.43	3.25	1.26	3.83	1.65	5.70	1.22	4.25	1.72

Mine No. 1—Swelled badly—could not push when ovens were "down."
Mine No. 2—Swelled badly—could not push when ovens were "down."
Mine No. 3—Swelled considerably—pushed, but with difficulty.
Mine No. 4—Swelled somewhat less than No. 3—pushed hard.
Mine No. 5—Same conditions as No. 3.
Mine No. 6—Swelled badly—could not push.

behavior of the coal and its ultimate analysis, but the laboratory results varied so widely that no definite basis for such comparison could be fixed.

PRESENT PRACTICE IN PREPARATION

The coal as mined from Mines 7 and 9, given above, is delivered in approximately equal quantities from the tipple bins onto a conveyor belt leading to Bradford breakers, where the lumps are broken and some of the bone, sulphur balls, etc., removed. The coal then passes to the crushing rolls, and is crushed to the following sizes:

	Sizes	Percentage
On $\frac{1}{2}$ -inch mesh.		3.78
Through $\frac{1}{2}$ -inch mesh.		95.4
Through $\frac{1}{4}$ -inch mesh.		78.5
Through $\frac{1}{8}$ -inch mesh.		66.2
Through $\frac{1}{16}$ -inch mesh.		57.5

Leaving the crushing rolls, it is conveyed on belt conveyors to a storage bin in the highest part of the washery building. Thence it is delivered through spouts to the feed screws of two rows of improved Campbell washing tables.

From the tables the washed coal is sluiced, using the same water with which it was washed, into nine concrete drainage pits, each holding 1500 tons. The refuse is also sluiced into two smaller pits and allowed to drain, afterward being loaded onto cars for removal.

The water from the drainage pits finds its way into sewers under the pits, is collected in a sump and pumped back to an elevated tank for re-use. Table II shows an

TABLE II. AVERAGE ANALYSIS OF MIXED COAL, WASHED COAL AND REFUSE

	Mixed Coal	Washed Coal	Refuse
Volatile matter.	17.00	18.00	13.30
Fixed carbon.	69.50	73.95	20.56
Ash.	13.20	8.05	66.14
Phosphorus.	0.012	0.011	0.046
Sulphur.	2.25	1.17	11.51
Silica.	5.61	3.50	28.60
Lime.	0.14	0.10	0.25
Magnesia.	0.32	0.06	0.34
Alumina.	3.52	2.73	16.42
Ferric Oxide.	3.02	1.28	20.38

average analysis of mixed coal, washed mixture and sludge. The average loss in crushing and washing is about 12 per cent. by weight.

After draining for an average period of 72 hr. the coal is removed, in successive layers of about 6 in. thick, from the top of the piles in the storage pits, by means of a traveling excavator which places it on belt conveyors, which, in turn, deliver it to the oven bins.

The average moisture content in the coal as delivered to the ovens is about 8.5 per cent. With fair oven heats the coking time is about 21 hr., and the coke yield about 80 per cent. of the coal charged, or the yield from coal as mined will average 68 to 70 per cent. of dry coke.

TABLE I. RELATION OF ELEVATION AND COMPOSITION TO EXPANSION OF COAL ON COKING

Elevation above sea.	Lower Kittanning—West Side of Stony Creek				Lower Kittanning—East Side of Stony Creek				Upper Kittanning			
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Coal.	Raw	Washed	Raw	Washed	Raw	Washed	Raw	Washed	Raw	Washed	Raw	Washed
Volatile matter.	15.40	16.34	15.54	15.12	17.37	17.65	17.90	17.73	17.66	17.80	17.53	17.14
Fixed carbon.	76.48	77.53	75.46	79.11	73.58	76.81	72.95	75.79	72.04	76.07	73.35	76.66
Ash.	8.12	6.13	9.00	5.77	9.05	5.54	9.75	6.48	10.30	6.13	9.12	6.20
Phosphorus.	0.012	0.008	0.008	0.007	0.012	0.012	0.010	0.009	0.013	0.011	0.012	0.011
Sulphur.	2.71	1.04	2.56	1.27	2.55	1.00	2.90	1.07	4.06	1.35	4.05	1.48
Silica.	2.52	2.31	2.40	2.39	2.98	1.61	2.96	2.63	2.55	2.50	2.38	2.10
Lime.	0.11	0.10	0.10	0.10	0.08	0.08	0.19	0.13	0.08	0.10	0.08	0.06
Magnesia.	0.11	0.18	0.31	0.43	0.11	0.12	0.21	0.15	0.11	0.21	0.22	0.17
Alumina.	2.10	2.06	3.02	1.35	2.58	2.38	2.40	1.85	1.80	1.98	2.24	2.04
Ferric Oxide.	3.20	1.44	3.08	1.43	3.25	1.26	3.83	1.65	5.70	1.22	4.25	1.72

RESULTS OF COKING TESTS

Mine No. 7—Average working conditions.

Mine No. 8—Swelled considerably—pushed with difficulty.

Mine No. 9—Average working conditions.

Nos. 7 and 9 are the mines from which the coal is being coked.

Mine No. 8 is the famous Rolling Mill mine, from which 3000 tons of steam coal are taken daily.

The product is regarded as a good metallurgical coke. It breaks with a good deal of cross fracture, into rather small rectangular blocks instead of fingers.

In appearance it is quite dense, with a large number of extremely small cells, and with the following physical characteristics: Apparent specific gravity, 1.005; true specific gravity, 1.847; porosity, 45.72 per cent.

After the shatter test of four drops from a height of 6 ft., 20.51 per cent. passes through a 2-in. mesh.

TABLE III. ANALYSIS OF COKE

Volatile matter.	0.81%
Fixed carbon.	89.28%
Ash.	9.90%
Phosphorus.	0.014%
Sulphur.	0.94%
Silica.	4.46%
Lime.	0.13%
Magnesia.	0.21%
Alumina.	3.18%
Ferric Oxide.	1.84%

MOISTURE IN COKE HIGH, BYPRODUCT YIELD 67 PER CENT. OF NORMAL YIELD

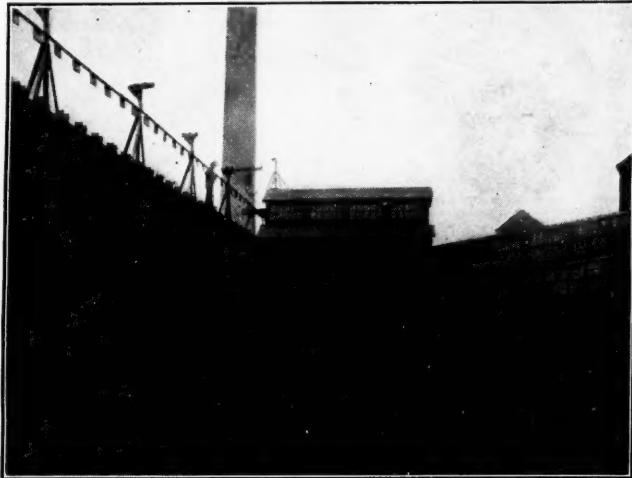
The moisture in the coke varies. With the small-cell structure mentioned above, it is difficult, in the first place, to quench the coke properly, and when so quenched that danger of fire in the cars is eliminated, the small cells retain a large percentage of water, with not enough heat in the cell walls to drive it off. Since the coke is used in the company's furnaces and the charges are measured, not weighed, the variable moisture is not so serious a feature as it might be under other conditions.

The byproduct yield is a disappointing feature in coking this coal. It will be readily understood that constant use of a more or less swelling coal in a brick oven will inevitably result in the distortion of that structure, with resultant cracks and unavoidable leakage of the products of distillation. In consequence, the amount of ammonia and tar recovered is about two-thirds of the possible yield and the surplus gas is not enough to justify plans for its use elsewhere.

The average life of the coking chambers up to the time when the walls become so crooked as to prevent pushing the charge, is about two and one-half years. Renewal of individual retorts or of a group, with the remainder of the battery in service, is not good practice, as the local expansion of the new brickwork tends to increase any cracks which may exist in the working portions of the battery. It is now believed that the best procedure is to work the battery as a unit as long as practicable, allowing ovens which become too bad for service to remain banked. When the number of idle ovens becomes excessive, the battery should be rebuilt as a whole.

EFFECT OF MOISTURE IN THE COAL

With oven chambers constructed altogether of silica brick, the question of what effect charging the wet coal into the hot chambers will have on the brickwork has repeatedly been asked. The face of the brickwork, after extended use, shows a slight checking or spawling, but in certain particularly good ovens, which have been in constant use six years, this checking is not enough to interfere with pushing the coke.



COKE PUSHER WORKING AT BATTERY No. 8

It is a question whether the moisture contained in the coal as charged may not be beneficial in coking a swelling coal. While wet coal weighs about 14 lb. per cu.ft. more than the crushed dry coal, the mixture as charged occupies considerably more space in the coking chamber than the same weight of dry fuel, due probably to the tendency of the moist particles of coal to stick together in irregular masses, thus forming interstices, which, when the coal later commences to swell in coking, provide room for a portion of the increased volume.

Tests have been made with dry coal and the coke apparently pushed about as easily as the usual charge. As the unwashed coal does not make satisfactory coke this practice could not be continued long enough to obtain definite information along this line.

The water vapor driven off during the process of coking, however, adds considerably to the volume of gases to be handled through certain parts of the byproduct apparatus.

From the foregoing it will be apparent that coking a lean semibituminous coal while practically impossible in beehive ovens, in retort ovens presents a variety of complex and interesting problems, such as do not fall to the lot of oven operators who can select their coal.

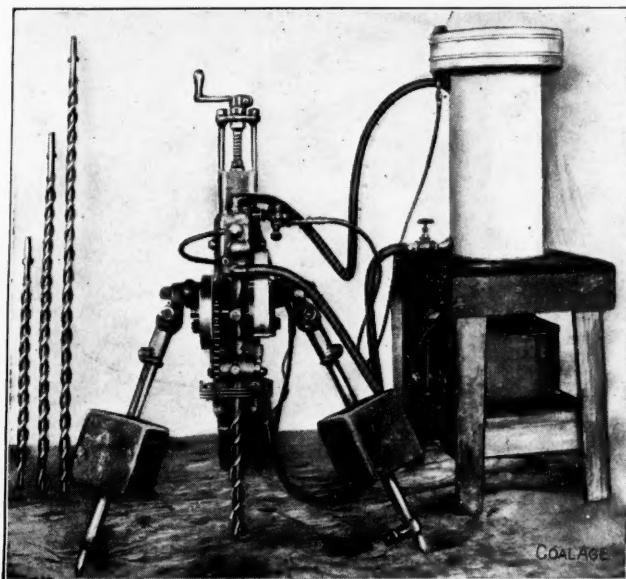
A Gasoline Rock Drill

A new and interesting gasoline rock drill has been recently developed in St. Louis, Mo. This has been built in four sizes, ranging from the hand drill weighing 35 lb. to the largest size which weighs 265 lb. and which will drill holes up to 20 ft. or more in depth.

The gasoline drilling engines are built to operate upon the two-cycle principle. They are free from gears, cams and pushrods. Backfiring is said to be impossible and speeds up to 3000 r.p.m. can be attained if desired.

The piston is moved rearwardly by energy stored in the flywheel and is picked up or cushioned on the return stroke by the compression of air. The drill steels are automatically rotated by means of a chain and sprocket which connects the crank to the rotator shaft.

Two types of drill steels may be used, one the common hollow steel through which water can be forced together



THE GASOLINE ROCK DRILL UPON ITS TRIPOD

with a small amount of explosive pressure for the purpose of removing the rock cuttings from the drill holes. The other type is solid but is formed with a spiral conveyor which works the rock cuttings out of the hole, in the same manner as a wood augur does its chips. This type of steel does away with the water connections which sometimes cause trouble.

It is claimed that this machine is fool proof and simple and light for its capacity; that it will drill rock at the rate of from three to 15 in. per minute and the largest machine uses only two gallons of gasoline per ten-hour day.

The roller bearings with which this machine is supplied are packed with grease and require attention only about once a month. The exhaust may be either cooled by being piped into water, or led to the mouth of the shaft or tunnel through pipe lines. In either case, provided the ventilation is reasonably efficient, the exhaust does not vitiate the mine air to any extent.

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Experience has shown that with the most careful of packing the surface subsidence will equal from one-third to one-half the thickness of a seam. Even where hydraulic packing is used the subsidence may be anywhere from 0 to 10 per cent. Allowance should always be made for this shrinkage.

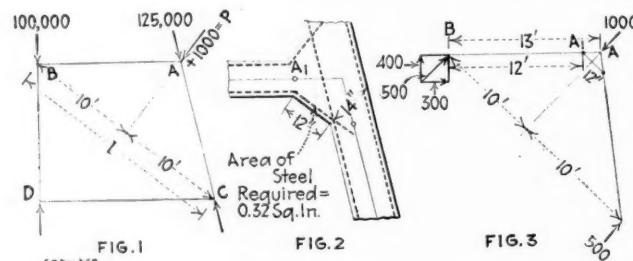
Colliery Practice in Concreting

BY ELWYN E. SEELY* AND A. T. SHURICK

SYNOPSIS—This is the third installment on this subject. In this issue the advantages of concrete are discussed, together with costs and methods of designing a number of different types of structures. A number of construction details, and few remarks on forms are also given.



In our previous issues of Dec. 14 and 28, we have described the processes involved in concreting operations, the general rules which should be followed to safeguard the execution of the work, the commonest types of rein-



FIGS. 1, 2 AND 3. STRESSES IN KNEE BRACING

forcement in use, and proposed formulas for the design of reinforced-concrete beams, slabs and struts. It is proposed in this article to take up the practical design of some of the ordinary structures which may be built in reinforced concrete.

Reinforced Concrete versus Other Materials—The first

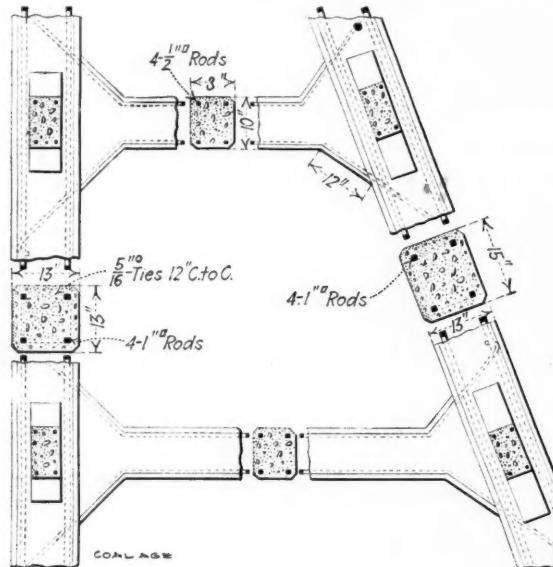


FIG. 4. COMPLETE DETAILS OF BENT PANEL

problem which will present itself will be the expediency of using reinforced concrete in place of steel or timber for a certain structure. Factors determining this are as follows: The occurrence of a suitable aggregate near the site, such as a gravel bed, slag or facilities for crushing rock, and availability of a suitable sand. Questions of

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life and durability of the structure will generally militate in favor of reinforced concrete.

COST OF REINFORCED-CONCRETE STRUCTURES

A rough idea of what a reinforced-concrete structure should cost may be obtained by using the figures given

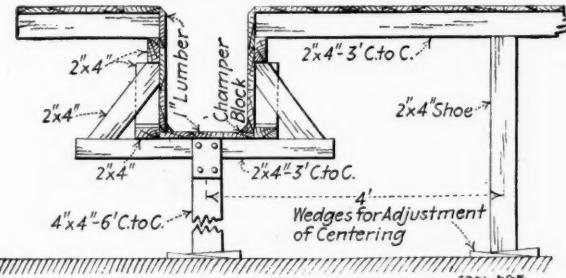


FIG. 5. FORM DETAILS

below. These price must be considered as basic inasmuch as they will vary greatly with location and conditions:

Column centering of concrete surface ¹	\$0.10
Centering for solid slabs ¹	0.11
Centering for tile and joist slabs including shoring for ordinary story heights ¹	0.10
Beam and slab centering and shoring ¹	0.08
Concrete in place ²	6.00
Steel reinforcement in place ³	0.025
Stiffened-wire lath in place ¹	0.06
Plastering three coats on stiffened wire lath ¹	0.07
Cement tile for roofs in place ¹	0.18

¹ Per square foot. ² Per cubic yard. ³ Per pound.

* A rough idea of the weight of the reinforcement in a structure may be obtained by the formula: weight of steel in pounds equals cubic feet of concrete times five.

REINFORCED-CONCRETE FRAMING

The frames of such structures as headframes, tipplers, breakers, washeries, buildings and trestles may be readily constructed of reinforced concrete. The main difference between the steel and reinforced-concrete frame is that in the concrete structure knee-bracing is generally resorted to in lieu of diagonal bracing. This is because diagonal-brace centering is uneconomical.

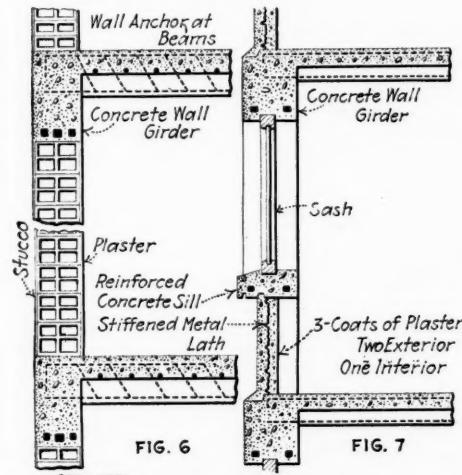


FIG. 6

FIG. 7

FIGS. 6 AND 7. SIDEWALL CONSTRUCTION

Let us assume a stress diagram for a unit of a frame and design the members and the knee bracing, see Fig. 1. The main stresses are assumed to be acting along the axis of the main members, but the wind load and vertical panel load will be resisted by the knee bracing and flexural

strength of the main members. This knee-brace design will be taken up first.

This problem is really statically indeterminate and susceptible of solution only by an excursion into the complication of the elastic theory. But, if we assume that *B* and *C* are pin connections, we shall have a higher bending moment in the angular beams *B A C* than if *B* and *C* are rigid joints, and hence, be on the side of safety. Accord-

Hence, we will make the horizontal strut 8×10 in. with four $1\frac{1}{2}$ -in. square rods, as shown in Fig. 4. The rods are placed in both top and bottom to provide reverse flexural strength which might be induced from the panel above.

The direct compressive stress in *AC* was assumed at 125,000 lb., and the axial component of the wind load is 400, making a total 125,400 lb., see Fig. 3. The formula

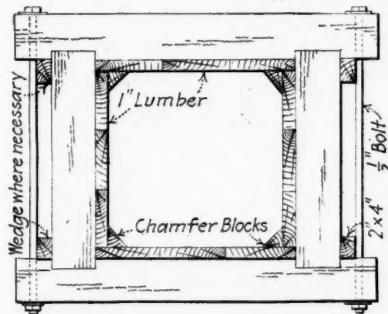
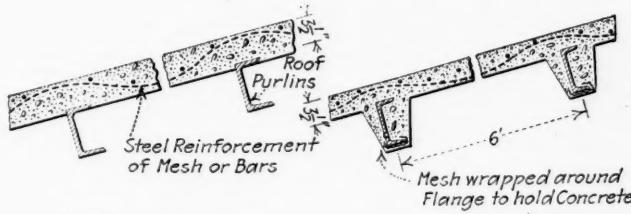


FIG. 8. COLUMN FORMS



FIGS. 9A AND B. STEEL AND CONCRETE ROOFS

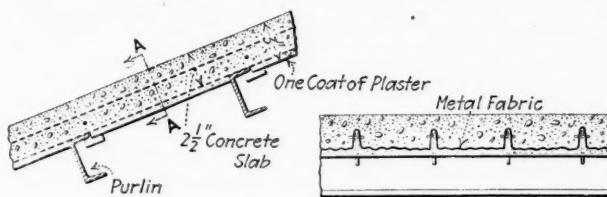


FIG. 10. SECTION A-A

FIG. 10. THE APPLICATION OF STIFFENED-WIRE LATH

ing to this assumption, if the 1000-lb. wind load is normal to *B C*, we have a bending moment at *A* equal to

$$\frac{1}{4} Pl = \frac{1000 \times 20}{4} = 5000 = \text{ft.-lb.} = 60,000 \text{ in.-lb.}$$

Now recalling the flexural formula for reinforced concrete (see our previous issue of Dec. 28, 1912, p. 901), $M = 108 bd^2$, where

$$M = \text{Moment in inch-pounds}$$

$$b = \text{Width of strut}$$

$$d = \text{Effective depth of strut}$$

We have $60,000 = 108 bd^2$. Assuming effective depth of joint = 14, see Fig. 2, and we have:

$$b = \frac{60,000}{108 \times 14 \times 14} = 2.8$$

Area of steel = $0.008 \times 2.8 \times 14 = 0.32$ sq.in. in strut. Next the bending moment at *A* should be calculated. This is done by determining the resultant at *B* or *C* normal to *AB*. See Fig. 3. We then have $300 \times 12 \times 12 = 43,200$ in.-lb., and by the formula for reinforced concrete in flexure gives us:

$$bd^2 = \frac{43,200}{108} = 400$$

$$\text{Assume } d = 8 \text{ then } w = \frac{400}{64} = 6\frac{1}{2} \text{ in.}$$

$$\text{Steel} = 8 \times 6\frac{1}{2} \times 0.008 = 0.42 \text{ sq.in.}$$

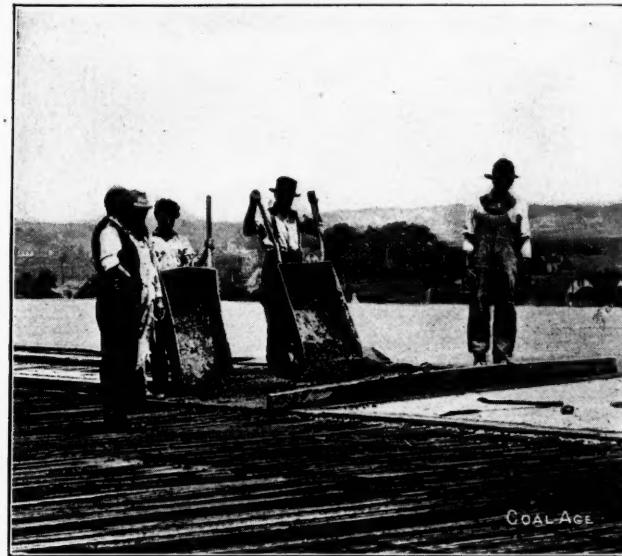


FIG. 11. CONCRETING A HY-RIB ROOF

for direct compression in a concrete strut is $W = (A_c + 15 A_s) 600$ in which

$$W = \text{The load on the strut.}$$

$$A_c = \text{Area of concrete}$$

$$A_s = \text{Area of steel.}$$

Hence, we have (see our previous issue of Dec. 28, 1912)

$$125,400 = 600 (A_c + 15 A_s) \text{ hence } A_c + 15 A_s = 209$$

Assume the steel reinforcement to consist of four 1-in.sq. rods, then:

$$A_s = 4 \text{ sq.in.}$$

and we have:

$$A_c + 60 = 209$$

$$A_c = 149$$

So that the strut should be 12×13 in., but in addition we have the flexural stress of 43,200 in.-lb. to take care of just as in *AB* above. As before, $bd^2 = \frac{43,200}{108} = 400$, and the effective depth of the strut 12×13 in. will be 11.5 in., hence $b = 3$. So that the strut should be 15×13 in. with four 1-sq.in. rods. A similar design for *BD* gives us a 13×13 in. strut.

There is also an additional compressive stress in the cross struts, due to the moment of wind load. This would be found for *AB* by taking moments around *C*, Fig. 1. The moment due to the force *P* must be resisted by a compressive stress in *AB*. However, for ordinary structures this stress is comparatively small and we will not consider it in our design.

The complete design of the unit is shown in Fig. 4. Attention is called to the fact that the actual flexural stresses, induced by wind load or other conditions, will be much lower than those obtained by the assumption of

pin connections at *B* and *C*. This is a good thing in a design where the nature of side stresses are indeterminate and where safety factors should be increased for impact.

Certain features of design common to tipples, washeries, power houses, breakers and miscellaneous buildings will now be discussed. These include roof, floor and sidewall construction and may be divided into two groups, namely, those where the skeleton frame is steel and where it is reinforced concrete.

ROOF CONSTRUCTION

Under the first group for roofs, we have the solid reinforced slab, and the concrete slab on stiffened-wire lath, as shown in Figs. 9, *a* and *b* and 10.

On steep-roof work it may be found advisable to run the ribs of the stiffened-wire lath horizontal in order to retain the concrete while pouring. This is opposite to that shown in Figs. 10 and 11. Stiffened-wire lath for this purpose is manufactured by the Trussed Concrete Steel Co., of Detroit, Mich., the Corrugated Bar Co., of Buffalo,



FIG. 12. A PRACTICAL APPLICATION OF AMERICAN CEMENT-TILE ROOFS

and the Northwestern Expanded Metal Co., of Chicago. An illustration of such a roof in process of concreting is given, Fig. 11.

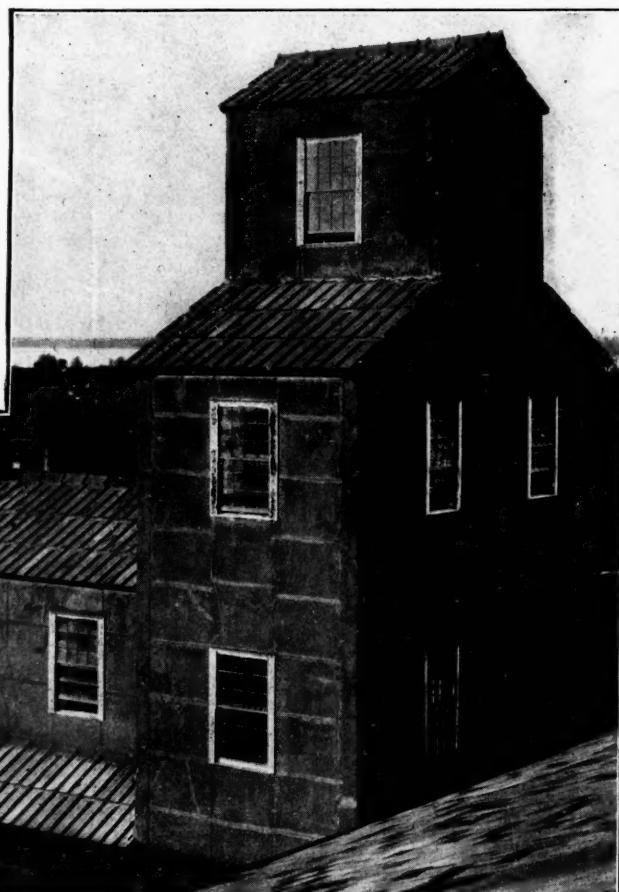
Concrete Purlins—Under this heading we have the beam and slab type, the tile and joist, and the stiffened-wire lath construction shown in Figs. 13, 14 and 15, respectively.

ROOF DESIGN

These roofs are designed by computing the flexure on the girders, purlins and slabs by means of the formulas given on p. 901, of our issue of Dec. 28, 1912. Wind stresses are taken care of by knee bracing between the main girders and columns as discussed in this article for the unit frame. Roof live loads should be assumed at 50 lb. per sq.ft. for flat roof and 30 lb. for pitched roofs. Attention is called to the method of forming the T-flange in Fig. 14 by the reduction of the size of the block.

Cement-Tile Roofs—Another economical type of concrete roof is the cement tile. This tile is really a reinforced-concrete slab. It is about $\frac{7}{8}$ in. thick and reinforced with expanded-metal lath. It weighs 13 to 15 lb. per sq.ft. The slabs are made to span between purlins on 4-ft. centers. The top surface is treated so that it is impervious to moisture. It will be seen from the illustration in Fig. 12 that the tiles lap and interlock. They

should not be used on a flatter pitch than one-quarter rise to one horizontal. This tile is manufactured by the American Cement Tile Co., of Wampum, Penn., and includes a complete line of special shapes such as gutter, ridge tiles, etc.



Floor Construction—The types of construction, shown in Fig. 9 *a* and *b*, 13 and 14, are commonly used in floors.

Sidewall Construction—The commonest forms of concrete sidewall construction are the concrete blocks, terra cotta tile, bricks, reinforced-concrete slab, and hydraulic plaster slab, used in connection with the stiffened-metal lath. The brick, concrete blocks or tile blocks may be used either as bearing walls or in skeleton construction, see Figs. 6 and 7. The formula for stucco is five parts portland cement, 12 parts sand and 1 part hydrated lime; to this may be added the coloring matter and an integral waterproofing compound, such as described in our previous article of Dec. 28, 1912.

FORMS OR CENTERS

The appearance of the finished structure will largely depend upon the quality of the forms, so that not only must we build true workmanlike forms, but they must be so stayed that they will not become deformed under the severe strains due to the heavy hydraulic pressure caused by ramming and the weight of the concrete mass.

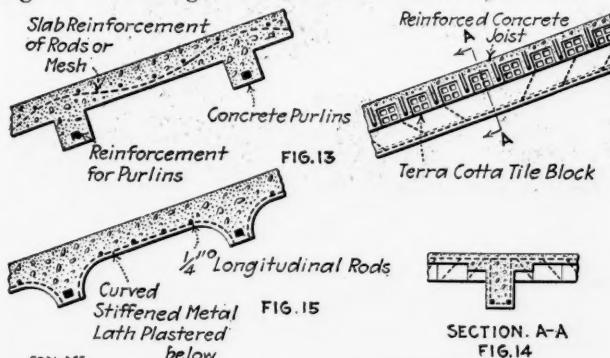
Class of Wood—In selecting a lumber, choose one which will not warp too readily, is not too hard to be easily workable, will not split when the forms are removed and which is also cheap. Spruce is an ideal lumber, and hemlock is coming into use because of its cheapness, but the

latter splits too readily to be a good material for forms. Cypress and yellow pine are suitable materials, but the latter is rather expensive.

Slab and Beam Centering—For forms supported on structural steel, $5/8$ -in. lumber may be used. Various methods for carrying the centering on the steel are in vogue, the commonest being to carry slab forms on beam boxes and suspend same with wire ties.

For the beam and slab construction, such as is shown in Fig. 13, one-inch material with 2x4-in. framing and 4x4-in. shores is suggested, as shown, Fig. 5.

A typical section of forms for a column is shown in Fig. 8. For octagonal columns the same forms are used



FIGS. 13, 14 AND 15. REINFORCED-CONCRETE ROOFS

with triangular blocks between the frames and the planking.

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New Coal Fields in Western Canada

BY PHILLIPS THOMPSON*

D. B. Dowling, of the Canadian Geological Survey, recently visited some new coal fields concerning which the survey had previously but little information. Among these were three small areas on Flathead River, B. C., a newly opened field on Saskatchewan River, east of the Brazeau coal field; and the Coteau in southern Saskatchewan.

One of the Flathead areas which is near the boundary appears to be the most important of these fields. It is a basin of rocks similar to the Crows Nest, but restricted in area to a few square miles. In this basin, seams of 20, 30 and 50 ft. are exposed by opencuts and prospecting tunnels and a very large tonnage can be safely expected. The seams dip at angles of about 20 deg. and are easily mineable. In the center of the valley, 20 miles north of the boundary, a block of these rocks on edge was also found, and the 50-ft. seam has been traced for two miles in a north and south direction. This is probably the extent of those measures. The third locality being prospected is near the North Kootenay pass and is a block recorded by Doctor Dawson, but is probably not so extensive as he supposed. Seams of 6, 12 and 18 ft. are exposed by tunnels. A mass of coal near the fault line is claimed to be the 50-ft. seam.

The coal field on the Saskatchewan is on the line of the Canadian Northern Ry. that is being built west from Stettler. Outside the break marked by the Brazeau hills, the Edmonton formation is brought to the surface and a 10-ft. seam of domestic coal is exposed beneath the railway grade, near the mouth of Shunda Creek. Inside the

Brazeau hills, Kootanie rocks are exposed, dipping west at about 20 deg. and four coal seams of 7, 14, 7 and 4 ft., respectively, are being opened for mining at the railway grade. A vast quantity of coal lies above this level, and it is believed that at one place between Shunda Creek and the Saskatchewan, the uprises from the main entry will measure 6000 ft. at right angles to the entry.

The fuels of southern Saskatchewan are found south of the main line of the Canadian Pacific Ry. The nearest coal supply to Moose Jaw, at present known, is south of Lake Johnston, and outcrops on the banks of the Lake of Rivers. This is a seam of about 8 ft. of lignite, which appears to be a good fuel.

G. S. Malloch continued his examination of the Groundhog coal basin, in British Columbia, and determined the southern, eastern and northern boundaries of the area in which coal-bearing strata occur. The southern boundary is situated near latitude 56 deg. 50 min.; the eastern follows the Dooti fork of the Skeena to Shawnee Lake, thence to the valley of the Cluatakutahn, from which it passes over a flat divide to the Cluayetz fork of the Stikine and thence over another divide to the east fork of Clappan River. The northern boundary is, approximately, latitude 57 deg. 30 min. Information given by prospectors leads to the belief that the western boundary runs up the east fork of the Nass River and over a divide to the main fork of the Clappan. The dimensions of the field are, therefore, roughly 30 by 45 miles; but in parts of this area the coal-bearing rocks have been removed by erosion.

While many new outcrops were discovered last season, no marked improvement in quality was noted, quartz or calcite veinlets being present in nearly all the seams and niggerheads and numerous thin beds of bone occurring in many of them. Proximate analyses of nine samples, from different localities in Groundhog basin, made in the laboratory of the mines branch, showed great variations in quality, the percentage of fixed carbon ranging from 40.81 to 80.25, the majority of samples, however, carrying upward of 60 per cent.

J. D. Mackenzie examined about 250 square miles in southwest Alberta, including most of the foothills area between the valleys of the South Fork River and Pincher Creek. The well known coal measures of Blairmore and Coleman, in the eastern part of the Crows Nest Pass, extend in part southward into this district, and an investigation into their extent and structure shows that there is a considerable amount of coal in this area that can be worked when railway transportation becomes available.

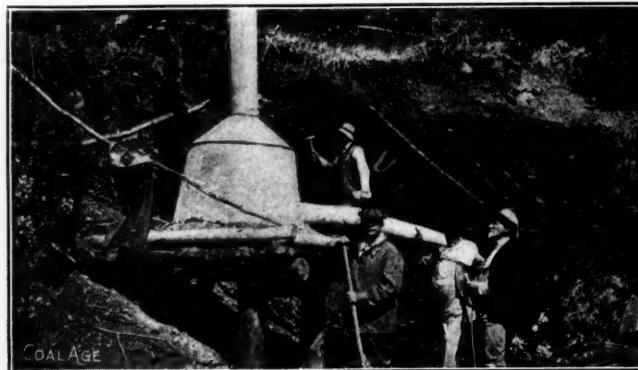
W. W. Leach made a detailed examination of the country covered by the Blairmore map sheet, an area of about 12 to 17 miles, including practically all the producing mines of the bituminous coal fields on the Alberta side of the Crows Nest Pass. Sufficient information was obtained to map closely the outcrops of the coal-bearing beds and the position of the major faults, rendering it possible to represent accurately the location of the coal measures and the quantity of coal available.

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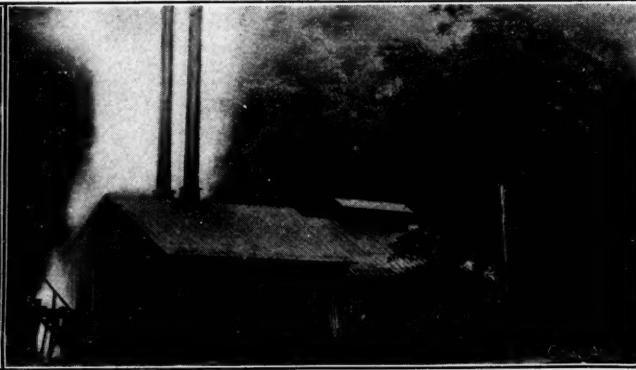
Nothing tends to shorten the life of a rope so much as bending and unbending on drums and pulleys which are too small. This fault is more often encountered in haulage drums and pulleys than in hoisting arrangements. The drums of hoisting engines and the head gear-pulleys are generally more than 100 times the diameter of the rope, which, according to many rope experts, is the minimum size of pulley for six-stranded seven-wire ropes. Head-gear pulleys should not exceed 18 ft. in diameter. If over this dimension they become unnecessarily heavy and lead to trouble and excessive local wear.

*Toronto, Canada.

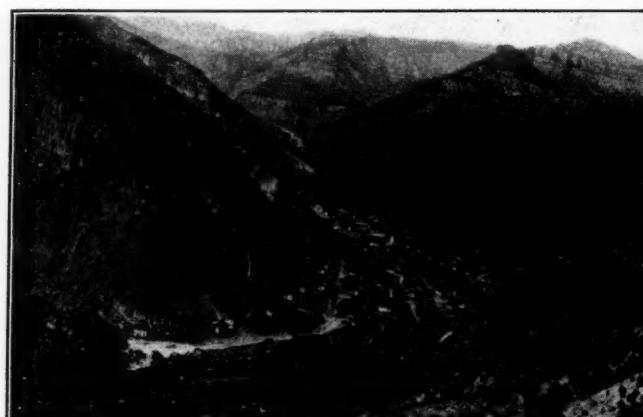
SNAP SHOTS IN COAL MINING



VENTILATING A PROSPECT TUNNEL IN BRITISH COLUMBIA



ELKRIDGE POWER HOUSE, NEAR ELKRIDGE, W. VA.

WRECK OF THE W. C. M. Co.'s
TIPPLE, AT FRANKLIN, KY.SURFACE WORKS AND COKE PLANT OF THE ISABELLA CONNELLSVILLE
COKE CO. HEIGHT OF HEADFRAME, 180 FT.

GENERAL VIEW OF THE WORKS



TOWNSITE AND COKE OVENS

TWO VIEWS OF THE SUNNYSIDE MINES IN UTAH

Kentucky Mines and Workmen's Compensation

BY K. U. MEGUIRE*

SYNOPSIS—The author describes the advantages of that form of compensation which divides the losses evenly among the operators of the state, regardless of the mine at which the accident took place. He compares this with the employers' liability decisions, which are satisfactory to no one but the lawyer who, as a result of the present jury system, is the principal person to be compensated.

♦♦♦

In at least 37 of the states of this country there have been adopted or are now under consideration, laws providing workmen's compensation and practically abolishing the old common-law defences, with which the employer could frequently meet suits for personal injuries which arose from accidents to men at work. In 15 of these states, the new system is now in operation; in the other 22, the subject is being considered with a view to legislation. But in Kentucky as yet, personal-injury suits still multiply; courts are clogged; all the other evils of the old era flourish mightily, and no official notice has been taken of what is an epoch-making change all over the civilized world.

COMPENSATION IS GREATEST FACTOR IN SOCIAL EVOLUTION SINCE CIVIL WAR

The principle of workmen's compensation is declared to be the greatest factor in social evolution since the Civil War; its embodiment in modern law is declared to mark an important step in industrial evolution. Certainly it has been the most prominent feature of labor legislation all over the world for several years. Patterning to a degree after the European nations, the United States Government first adopted this principle for compensating accidents at the naval stations, arsenals and in the limited sphere of federal jurisdiction. Later, one by one, the various states, led by Maryland, have adopted laws, extending this protection to the more numerous individual corporations.

I shall not discuss the abstract principle at length. Its essential value rests in the distribution of the economic loss arising from an accident by removing this loss from one or several employers and employees and dividing it among all the persons engaged in the industry in question, thereby placing that loss finally on the consumer in the form of a slight increase in price on every unit of manufacture which he buys.

THE EVILS OF EMPLOYERS' LIABILITY

The benefits of workmen's compensation are not yet as certain as are the evils of employers' liability, which it practically supersedes. The old scheme of law devised in England at a time when materials were manufactured by small groups of workmen under the personal direction of the employer, relieved the latter of liability for damage arising from an accident, where the negligence of the injured workman or that of a fellow-employee contributed toward the injury. With the radical change in industrial conditions due to the introduction of mod-

ern machinery, the division of labor, and the grouping together of large armies of workers, there came greater danger of accident and greater difficulty in placing responsibility therefor, and it has gradually dawned on the minds of men that negligence is an unavoidable factor in modern industry, and that there will be less disturbance of business and less hardship on human beings when its consequences are borne by the entire industry and not by one or several individuals.

By abolishing the old defences of the employer, the new order of things seeks also to do away with personal-injury suits altogether, to relieve the state of expensive litigation, which now congests the courts, to ease the employer and employee alike of the uncertainty and inconsistency of jury verdicts, to save the employee heavy court costs and lawyers' fees; to exempt the employer from loss of time in court attendance, and, finally, to clear the whole industrial horizon of the ill-feeling invariably attendant on personal-injury actions.

THE UNCERTAINTIES IN WORKMEN'S COMPENSATION

In escaping these known evils, we may expose ourselves to others, which are yet unforeseen. The experience of the 15 states which have compensation or state insurance laws is as yet too brief to have bared all the weaknesses of the new system. In Germany, we are told, the costs of administering the state's industrial insurance are so great as to be burdensome to the industries it was established to protect. In this country, from the mass of data and argument collected by the Bureau of Labor and by private interests, such as the casualty companies, it is impossible as yet to form even an approximate estimate of the cost of compensation.

Nor is the time yet ripe to appreciate the full effect which the system will have on the relations between labor and capital. Even the legality of the various state laws or vital parts thereof is still in question, numerous cases instituted to attack these laws in a number of states being still pending.

It seems to me that the disposition of the large sums of money collected from the various industries to compensate their injured employees must be safeguarded with the utmost care to prevent widespread fraud and graft. That, in addition to the danger of waste and corruption, there is likely to be a continual struggle between labor and capital as to the amounts to be fixed for compensating the several classes of accident, the former seeking to increase and the latter to decrease these amounts unduly, and bringing into play to accomplish these ends all the disorganizing methods of political chicanery.

Whatever be the ultimate cost in money, strife and corruption, the ills of the employers' liability system seem to me so great and the relief promised by workmen's compensation so tangible and attractive that I look for the automatic compensation method to prevail in every state in which the so called hazardous occupations are carried on.

The loss of the entire United States through work accidents is now estimated at about \$250,000,000 annually. The figures would convince economists that a deficit

*President, Harlan Coal Mining Co., Coxton, Ky.

Note—Abstract of paper read before the Kentucky Mining Institute, Lexington, Ky., May 17.

of such magnitude should be distributed with care, so that individual employers or employees be not swamped by an accident, while their fellows enjoy temporary immunity.

THE EMPLOYERS' LIABILITY IS TO THE LAWYER RATHER THAN TO THE EMPLOYEE

But economists cannot do much to enact or defeat compensation. For the employer, the strong argument for compensatory laws is furnished by the inconsistency and injustice of many jury verdicts. And on the other hand, the injured employee or his dependents, while they may usually rely on sympathy from a jury, receive little or none from damage-suit lawyers; so that after they have collected a judgment—probably excessively large—against an employer, and after they have paid their 50 per cent. contingent fee, they may have a net balance to their credit amounting to much less than the fair compensation given for injuries by the new system. Indeed it may be said with almost entire truth that under the past laws the principal liability of both employer and employee was the lawyer, rather than the accident.

The coal-mining business of Kentucky is now the second largest of the state's productive occupations, exclusive of agriculture. The gross value of output is more than \$16,000,000 per annum, and its importance as an industry in Kentucky ranks next to that of the distilling of whiskey. In addition thereto, it yields to the transportation companies a revenue in freight somewhere between \$12,000,000 and \$15,000,000 within the boundaries of Kentucky alone, and further revenue to connecting lines serving a territory extending from the far Northwest to Florida and the Gulf of Mexico. Its aggregate payroll, amounting to about \$13,000,000, maintains nearly 25,000 employees and their families, and spreads through channels of trade in a hundred different directions.

Not only has the coal industry already assumed this magnitude, but it will soon outstrip all other productive industries of Kentucky, barring agriculture alone. Present mining developments along Kentucky River, the upper Cumberland and Big Sandy Rivers assure that the 20,000,000-ton mark will soon be reached.

THE LOW MINING-ACCIDENT DEATH RATE IN KENTUCKY

But there is another side to this picture of prosperity and growth, and the more sensitive public conscience of this day will not allow this unattractive side of the picture to escape scrutiny, or its meaning to remain uninterpreted. This side of the picture is an exhibit of the toll of human life and the destruction of health and efficiency, with a consequent loss of money to employers and employees alike, and an added burden imposed on the state by an increase in the ranks of paupers and other public charges.

It is true in Kentucky we may console ourselves that our record of mine fatalities compares favorably with the averages for industry through the entire United States and even bears comparison with the figures from states in which the mining industry has been for some years the subject of much remedial legislation.

The latest publication of the United States Bureau of Mines, shows that in all the mines of the United States the total deaths in 1912 were fewer than in any year since 1906, and conspicuously fewer per 1,000,000 tons of output or per 1000 men employed. But while all the

mines of the country killed 4.29 employees per 1,000,000 tons, Kentucky during the same year killed only 3.25. And while the nation's mines killed 3.15 employees per 1000 on the payrolls, Kentucky's mines killed only 2.08 per 1000.

AMOUNT AND MANNER OF COMPENSATION

The laws of the 15 states in which compensation is already required by law, and also the act of our neighboring state, West Virginia, effective May 22, impress us, on examination, with the simplicity of the problem of compensation for fatal accidents. The range of the compensation fixed by the various states is not wide, extending from a minimum of three years' average earnings, or \$2000, to a maximum of six years' average earnings, or \$6000.

In nearly all states, the commission is instructed to disburse the compensation in weekly or monthly payments, as in the discretion of the commission may best suit the particular case. I cannot overlook an opportunity here to emphasize the merit of this method of payment over the system that now results. After several years of controversy, the dependent family secures by jury verdict a lump sum of money, which is shared with their attorney. They do not have the proper knowledge or experience to handle it, and so it is with them, in most cases, for only too brief and fleeting a period.

THE COMPENSATION FOR PARTIAL DISABILITY IS THE UNCERTAIN FACTOR

A compensation of \$3000 as the average economic loss of a death in Kentucky mines would have cost the industry as follows under a State Compensation Law:

1910, 84 lives.....	\$252,000
1911, 44 lives.....	132,000
1912, 52 lives.....	156,000

and considering the present premiums on casualty insurance, the industry could well afford to meet the bill. I will say, however, that attractive as the new system appears to me in general, I think we will have to jump in the dark in regard to nonfatal accidents, for I see no means of ascertaining, within any bounds of reasonable certainty, what the bill for minor accidents will be. While several of the annual reports from the state mining inspector give the number and classification of non-fatal accidents, it is certain that under the system of compensation for all injuries, the list of such injuries may soon become appallingly lengthy and the amounts demanded for these accidents will exceed those claimed for deaths and total disabilities.

Though the operator will, under the proposed legislation, eliminate excessive jury verdicts, he need not be too confident that workmen's compensation will necessarily afford less expensive insurance than he is now able to purchase from the companies that are embraced in the so called Conference, much less that it will be cheaper than that furnished by several outside companies, which now make rates as low as 90c. per \$100 of annual payroll, and did until the last year or two, write policies for as low as 7 mills on the dollar.

Not cheaper insurance, but more complete protection is due the operator, for the policies now written by the companies to indemnify operators for damages recovered under their present employers' liability, indemnify only within certain limits, and when a jury verdict is rendered against the operator, assessing damages greater than the

maximum fixed in the policy, either due to the loss of one life or the results of one accident, the operator is left to pay a sum which may be greatly in excess of his stipulated maximum.

But this danger is not the only serious objection to the present indemnity policies, as the loss of time and money due to court attendance is expensive alike to the defendant employer and to the commonwealth, and friction between employer and employee is continually aggravated by the personal negotiation of claims for damages arising from a death or from the breaking of a finger. The employee is prone to feel that if he does not take the claim to court, he will be a recipient of charity, and not justice.

A STATE COMMISSION TO ADMINISTER INSURANCE FUNDS

Therefore, when we come to consider the advantages of the compensation system, let us assure ourselves at the outset that to achieve satisfaction for either employer or employee, it must be reasonably fair to both; that it is not merely a device by which the former may escape being "soaked," nor a scheme of graft by which the latter may recover money for accidents numerous and trivial. Let us bear in mind that the ideal condition is one whereunder all accidents will be fairly compensated, with the least possible interruption to business, by the payment of fixed sums of money in such manner as is best suited to the beneficiary. This should be paid promptly, but with due care, by a state commission, which body should be free of the influence of party politics. Payments should be made out of general funds collected from the several hazardous industries and carefully guarded.

I strongly recommend that the Kentucky Mine Owners' Association, either alone or in conjunction with the body representing the southern Appalachian coal operators, constitute a committee to advise with the framers of a compensation act. If this be done, Kentucky will be as conspicuous in her success in compensating mine accidents, as she now is in reducing their frequency.

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The Belle Valley Mine Explosion

The following letter from J. C. Davies, the state mine inspector of Ohio to the governor, James M. Cox, relative to the Belle Valley mine explosion, needs no further comment:

On the evening of May 17, at 11 p.m., the State Mining Department was notified that an explosion had occurred in the Imperial Mining Co.'s Imperial No. 3 mine at Belle Valley, and that a number of men were entombed as a result of the explosion, the news having been brought to the surface by four of the men who though employed in the mine at the time had escaped the force of the explosion.

Upon arriving at the mine, I ascertained that the bodies of the entombed men had already been reached. Immediately following the explosion, District Mine Inspector Abel Ellwood of the fifth inspection district, in conjunction with General Superintendent Thos. Matthews of the Imperial Mining Co., made arrangements with the Pennsylvania R.R. Co., to run a special train from Cambridge to Belle Valley, carrying rescue equipment and medical aid.

District Mine Inspectors Hill, Grogan, Morrison, Devore, Werker and Wheatley, were also notified of the explosion, and with myself went to the mine to render such assistance as was possible. Upon the arrival of the special train, rescue parties were organized to enter the mine. The ventilating appliances were not deranged, and this led us to hope that at least some of the entombed might be still alive.

Previous to the arrival of the rescue equipment, Henry Fairhurst, of Belle Valley, and several others entered the

mine to attempt to rescue the injured. They succeeded in saving J. R. Yeager, who was badly hurt, but Fairhurst died from the effects of breathing the afterdamp.

Superintendent J. B. Morris of the Caldwell mine, John Smolley of the Laura mine, and others, formed a rescue party and penetrated the mine to the seat of the explosion, where they encountered the bodies of several of the victims.

Upon the arrival of myself and the other inspectors, we found the work of the recovery of the bodies well under way, several of them having been brought to the surface. We entered the mine, made our way to the vicinity of the trouble, and rendered what assistance we could, and continued at the work until the last body was recovered, which was about 11:30 Sunday morning.

Upon our arrival at the mine early on Monday, we found Jas. W. Paul, the engineer who is in charge of the federal station at Pittsburgh, and two of his assistants, had arrived for the purpose of making an investigation for the federal government, and to render all assistance.

In company with the above and John Moore, state president of the United Mine Workers of America, Lee Hall and William Thompson, vice-presidents of the same organization, we entered the mine and proceeded to obtain evidence that would enable us to determine as nearly as possible where and what caused the explosion. Returning to the mine on Tuesday, we completed our investigation. A report of this party of inquiry is herewith attached to this report.

Mine Inspector's Report

We have today completed an examination of the O'Gara Coal Co.'s Imperial No. 3 mine, Noble County, O., with a view of determining the cause of the explosion in that mine on the evening of May 17, 1913.

This explosion occurred between six and seven, p.m., at which time twenty men were in the mine. Of this number 14 were killed, and several others injured. The number of fatalities was later increased to 15 by the death of Henry Fairhurst, who was overcome while attempting to rescue one of the injured men.

As a result of our investigation, it is our opinion that the explosion originated in the vicinity of No. 5 room, off No. 7 south entry, and that it was produced by the ignition of a body of firedamp in or near this room. The force of the explosion seems to have radiated from this point.

The direction of greatest force was from the vicinity of No. 5 room, in No. 7 entry outward through No. 7 entry and through the crosscuts into No. 8 entry. In the latter heading opposite No. 4 and No. 5 rooms, a number of men were engaged in laying a side track and two machinemen were cutting a skip from the east rib of No. 8 south entry. Ten of the victims were found along No. 8 entry: one in No. 1 east entry, just west of No. 8 south; one in No. 1 room in No. 1 east entry, one in No. 7 south entry between No. 4 and No. 5 rooms; and one in No. 1 room in No. 4 east entry. None of them were mutilated to any considerable extent, but all except the one in No. 1 room in No. 4 east entry were severely burned.

Considerable marsh gas is generated in this section of the mine, and an examination of the workings in the vicinity of the scene of the explosion on May 19, and 20, showed traces of firedamp in most of them.

In our investigation we found no dates marked in the working places later than May 16, indicating that these places had not been examined by the fireboss on the date of the explosion. Evidently, the ventilation had been cut off this section of the mine for a considerable time, thus permitting a body of firedamp to accumulate, and some of the workmen, presumably the one found between No. 4 and No. 5 rooms, in No. 7 entry had entered No. 5 room with a naked light, igniting the gas.

APPROVED

J. C. DAVIES,
Chief Inspector of Mines.

THOS. MORRISON,
Inspector 9th District.
L. D. DEVORE,
Inspector 10th District.
R. S. WHEATLEY,
Inspector 12th District.
W. H. WERKER,
Inspector 8th District.
THOS. F. GROGAN,
Inspector 11th District.

When testing for gas with a safety lamp, remember that (1) The height of the cap depends not only on the amount of gas present, but also upon the size of the testing flame. (2) That a 1½ to 2 per cent. mixture produces quite a large, though very delicate cap, with a testing flame having a small white apex. (3) That density is a better indication of percentage than height.

Concrete in Mine Construction

BY A. S. ALLARD*

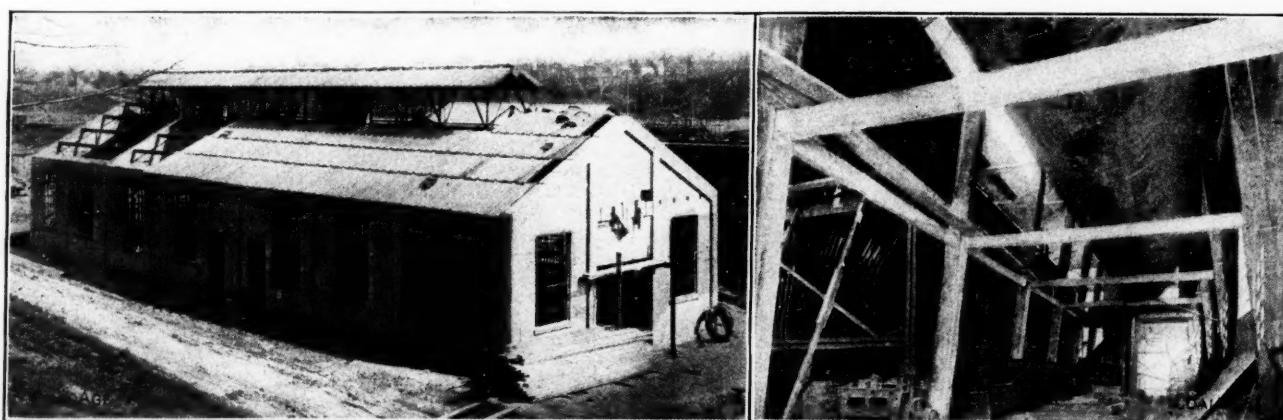
SYNOPSIS—The modern coal-mining plant uses a large amount of concrete above and below ground to assure permanence and safety from fire. A concrete shaft costs only about one-third more than one cased in wood. The author describes three kinds of concrete shaft-bottom linings and details the appropriate places for their respective use.

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Within the last few years, a great many important advances have been made at the modern coal plant in the use of concrete for buildings, shaft-lining walls and con-

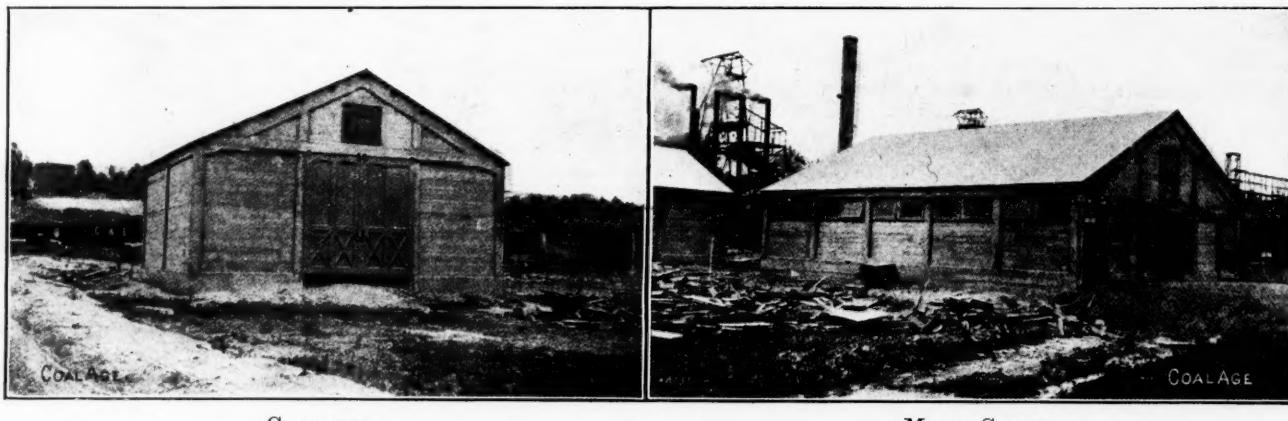
in appearance as compared with an installation of steel stacks which are subject to deterioration from rust and require frequent painting and attention; while no expense for maintenance after first cost is necessary on a concrete stack. Coal-storage bins and water-supply tanks are now erected of reinforced concrete, instead of wood or steel.

This material now replaces the wooden walks and platforms of the steel tipple and the members themselves are protected from rust and mine gases with a covering of the same material. Swimming tanks built of concrete



VIEW OF CONCRETE MACHINE-, BLACKSMITH- AND CARPENTER-SHOP BUILDING

REINFORCED-CONCRETE BUNKER; CAPACITY, 250 TONS



GRANARY

MULE STABLE

struction inside the mine. The appearance of the up-to-date plant is wonderfully improved with its concrete mine buildings, consisting of the power plant, hoist house, repair shop, miners' bath house, fan house, supply house, powder house and outside stable. These fireproof structures with reinforced-concrete walls, concrete floors and cement roof covering are permanent and involve little or no expense for upkeep during the life of the plant.

The boiler house, with its reinforced-concrete chimney towering to a great height, is substantial and attractive

prove a source of amusement and recreation for the employees at a coal-mining plant.

SHAFT WALLS

As a fireproof and permanent material for the lining of shaft walls, concrete is without a rival. From comparative cost data, I find that the price per vertical foot of a completed concrete-lined shaft is about one-third more than for one encased in wood. As timbers have to be renewed after a short period of time, this additional cost in first construction is soon absorbed by the savings in repair bills. Of all the numerous designs for concrete shafts, rectangular, circular, elliptical, etc., the shaft with straight sides and circular end walls is the most economical. The end space is utilized for pipeways

*Chief engineer, Bunsen Coal Co., Adams Building, Danville, Ill.

Abstract from a paper read at the Mining Conference in connection with the dedication of the Transportation Building and of the Locomotive and Mining Laboratories, University of Illinois, May 10, 1913.

or stairways, and excavation and concrete yardage is reduced to a minimum. The circular end walls adequately resist the pressure of the strata and of the water, forming as they do a concrete arch from the surface to the shaft bottom. However, the sidewall pressures have to be resisted by the thickness of the concrete lining, and this must depend upon the nature and depth of the strata penetrated. Self-sustaining measures, such as rock, sandstone, slate or good shale, generally require a wall of from 6 to 9 in. in thickness. This is sufficient for the anchorage of the buntons. A heavy fireclay or wet sand would require a much thicker wall.

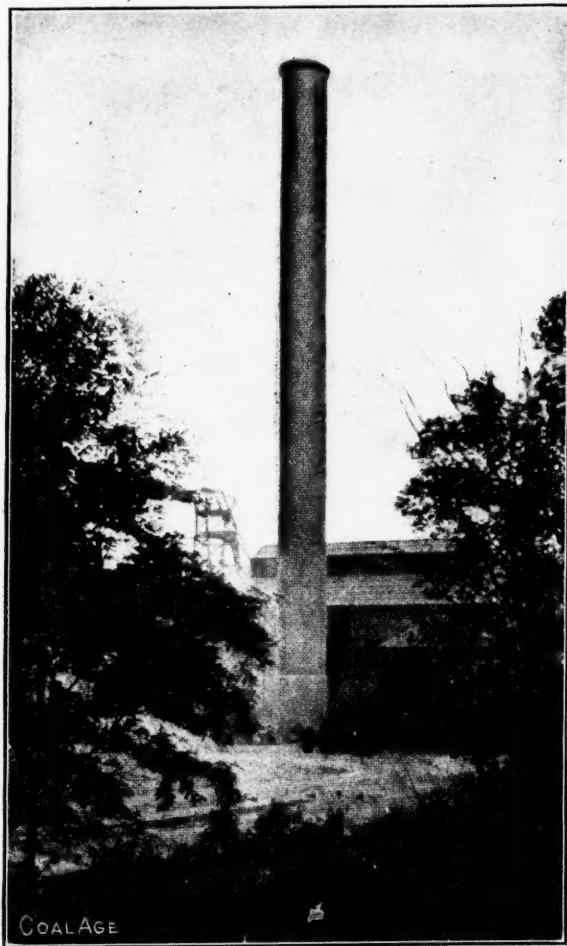
SHAFT-BOTTOM LININGS

Shaft-bottom linings can be constructed in one of three ways: First: A wall of rectangular section can

joints disposed on two radial planes. Blocks are laid up in the arch crown from each side wall with cemented joints, supported on a light framework until the key piece is placed and one section of the arch is thus completed.

Provision is made in molding to provide blocks of different lengths so that joints are broken on alternate courses. Blocks 6 in. thick for single- and 8 in. for double-track spans, and about 18 in. long make a convenient size for men to handle. This method of arch construction is much cheaper than that of the solid-poured sections, for it eliminates the cost of expensive forms and the time necessary for the transporting and placing of the wet mixture.

The first system is preferable at the back of the shaft where it is necessary to provide clearance room for the



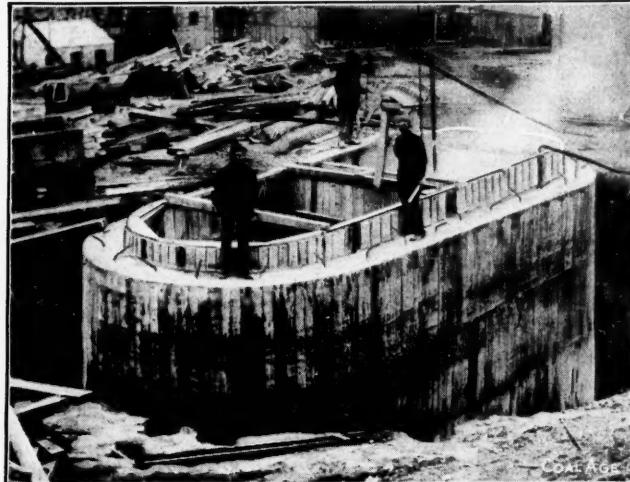
THE 175-FT. CONCRETE SMOKE-STACK, LINED WITH BRICK FOR LOWER 75 FT.

be built along either side supporting I-beams. These can be covered with reinforced-concrete slabs having a thickness of three or four inches. The depth of the beam is usually 6 or 8 in. for a single-track span, and from 12 to 18 in. for that of double-track, but the size and weight of the beam selected depends upon the nature and condition of the room. My practice has been to place the beams on 4-ft. centers, covered with slabs 2 ft. in width.

Second: A poured-concrete arch with concrete sidewalls. Third: The concrete-block arch, which is composed of plain concrete blocks molded in steel forms with



CONCRETE MINE OFFICE



VENTILATING SHAFT AT UNIVERSAL MINE

empty-car lifts and where cutting into the roof with an arch of large span would prove expensive.

The second, or poured-arch section, is generally adopted for a distance of from 10 to 15 ft. on each side of the shaft, the work being connected to and supporting the shaft walls. By continuing the arch with concrete-block construction for the main landing and empty run-arounds, an ideal and fireproof shaft bottom is made.

[All the above illustrations are of erections at the Universal mine of the Bunsen Coal Co., Clinton, Ind. Other views of the same plant can be found in Vol. I, pp. 234-236, and in Vol. 3, p. 115.—Ed.]

COMING SOCIETY MEETINGS

Mine Inspector's Institute of the U. S. A.—J. W. Paul, secretary, Pittsburgh, Penn. Annual meeting at Birmingham, Ala., June 10, 11, 12 and 13.

Coal Mining Institute of America—C. L. Fay, Wilkes-Barre, Penn., secretary. This institute holds its annual meeting at Pittsburgh, Penn., on June 17 and 18.

Michigan-Ohio-Indiana Coal Dealers Association—G. F. Nigh, secretary, Columbus, Ohio. This association holds a joint annual meeting with the order of Kokoa at Cedar Point, Ohio, June 17, 18 and 19.

Order of Kokoa—C. E. Lester, secretary, No. 1 Broadway, New York City. This society holds a joint annual meeting with the Michigan-Ohio-Indiana Coal Dealers Association at Cedar Point, Ohio, on June 17, 18 and 19.

West Virginia Coal Mining Institute—Prof. E. N. Zern, secretary and treasurer, Morgantown, W. Va. This institute holds its annual meeting at Morgantown, W. Va., on June 24, 25 and 26.

American Institute of Mining Engineers—This institute holds its next annual meeting at Butte, Mont., on Aug. 18 to 21 inclusive. Bradley Stoughton, 29 W. 39th St., New York City is secretary.

The Situation in West Virginia

The West Virginia Mining Association, W. N. Page, Pres., has issued the following statement regarding the labor situation there:

"The United Mine Workers of America are making capital out of the forthcoming investigation by the Senate subcommittee of conditions in the coal mines of West Virginia. Thomas Haggerty, the international board member, who has headquarters in this city, issues frequent bulletins recounting the success of his efforts to 'settle the strike on New River,' and of his trips into that region 'to bring the miners and operators together,' when, as a matter of fact, no strike exists on New River, and Mr. Haggerty has never left Charleston. Nor have the miners on New River any desire to strike.

"The most convincing evidence that a strike exists is the fact that the production of the mines on New River for the six working days ending Friday, May 30, was 123,120 tons shipped by the C. & O. alone, which is about the average for the last six months.

"The miners are being told that the Senate subcommittee is coming to put all the forces of the United States Government to work to insure them the full enjoyment of their rights to join the Union, the inference being that they had better join at once and so avoid future trouble at the hands of that organization.

"The Union is also making a play to the galleries by ostentatiously manufacturing tents in a conspicuous place here to 'shelter the strikers on New River.'

"Incendiary articles abusing Governor Hatfield for his efforts to restore normal conditions are being sent to daily papers in the state by ex-Senator Sam B. Montgomery in behalf of the Union, accompanied by letters offering to pay advertising rates for their publication. The Union has ample funds, for the assessment of 50c. a month on all members for use in West Virginia is still in force. This alone yields at least \$2,250,000 a year. In addition the United Mine Workers of Illinois in the last week in February voted to give \$900,000.

"As the Union has but 3200 members in a total of 79,781 mine workers in the state, it is essential that this should be one of the cases in which 'money talks.'

"These activities have two objects: First, to make the miners believe the Union is carrying everything before it in the state, and that if they do not join at once they may find themselves out of a job; the second is to impress the Senate subcommittee with the importance of the Union and its magnanimous attitude toward the operators in offering its good offices to 'settle' a 'strike' that never existed."

Coal Mining Institute of America

The meeting of the Coal Mining Institute of America is to be held in the Assembly Hall of the Engineers' Society of Western Pennsylvania, 25th floor of the Oliver Building, Pittsburgh, June 17 and 18.

The following is the program beginning on Tuesday afternoon:

"A Pictorial Survey of the Pennsylvania Bituminous Coal Field." Introduced by John Boileau and illustrated by private maps and numerous lantern slides showing distinctive operating and transportation developments of principal mining companies.

Inspection of offices and appliances of the U. S. Weather Bureau by invitation of Henry Pennywitt, Local Forecaster.

H. C. Frick Coke Co.'s "Safety First" show, demonstrating methods of safety instruction used by this company. Stereopticon and motion pictures, combining instruction and entertainment in a novel and interesting manner.

In the evening there will be a banquet.

On Wednesday in the forenoon a visit will be made to the Carnegie Museum, by invitation and under direction of Dr. W. J. Holland, Curator.

In the afternoon, the Bureau of Mines will either arrange a demonstration at the Arsenal Grounds, or a trip to the experimental mine operated by the Bureau.

The meeting was to have been held at Wilkes-Barre, Penn., but the place was changed because so many of the operators and other mine officials were too busily engaged to permit of their attending.

A Government-Approved Mine Lamp

The Ceag* portable electric mine lamp has the distinction of being the first to be approved by the United States Bureau of Mines. The approval was granted on June 3 and carries with it the permission to attach a plate to each lamp, reading as follows:

"Permissible electric hand lamp, United States Bureau of Mines, Approval No. 1."

The approval is given under the restriction that any modifications the manufacturers may desire to make at any future date shall first be submitted to the Bureau, in order that they may be subjected to the necessary tests. The Bureau also reserves the right, should occasion demand, to rescind its approval at any time. The use of unapproved changes in the design and construction of the lamp will be considered as sufficient reason for withdrawing the approval, as will also any developments which may appear in practical use that prove it to be unreliable, unsafe, or easily made so.

The Harlan Coal Field in Kentucky

We are informed by Frank A. Carr, of Hendersonville, N. C., that two of the photos used in our article under the above title (See COAL AGE, Vol. 3, No. 21, p. 796) were copyrighted by him. A notice to this effect was unfortunately overlooked.

*For detailed description of this lamp see "Coal Age," Vol. 2, p. 393.

Gates for Run-of-Mine Coal

BY F. V. HETZEL*

SYNOPSIS—The disadvantages and inconvenience of the slide gate are well known to mining men. Various types of undercut gates are here described and illustrated.

Most men in the soft-coal business know that it is almost impossible to control the flow of run-of-mine coal by an ordinary slide gate. There are several reasons for this.

First: A gate opening which will pass run-of-mine coal without choking is necessarily large and the weight of the gate plate makes it hard and slow to handle.

Second: If the gate in closing comes down on a lump, the small coal and slack continue to flow under the edge

and either stay in the chute or else fall over the edge of the gate.

TIPPLE GATES ARE USUALLY COUNTERBALANCED

For tipple work the undercut gate is usually counterbalanced to make the movements easier and more rapid,

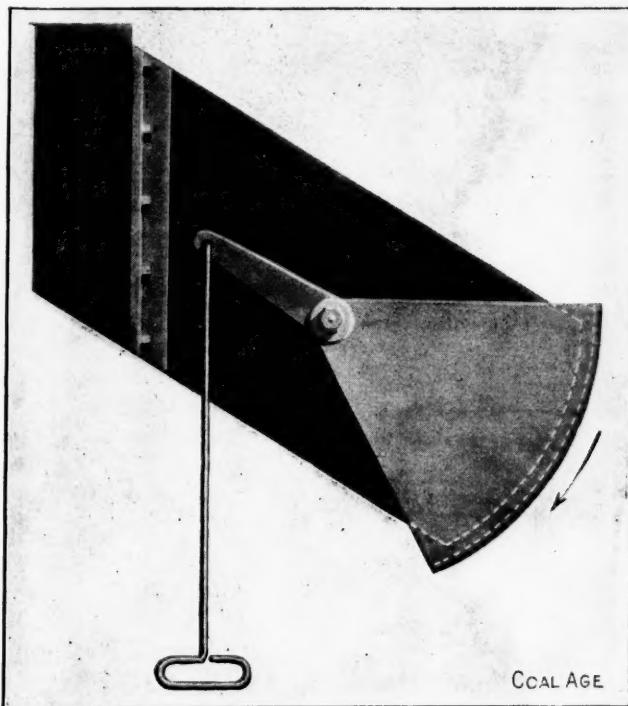


FIG. 1. PIVOTED UNDERCUT GATE IN ITS SIMPLEST FORM

of the plate; to stop this the gate must be repeatedly lifted and dropped until it happens to miss all large pieces. Slide gates with rack-and-pinion movement have been used to give the operator a better control of the gate and large plates are sometimes fitted with steam or air cylinders to force the gate down in spite of large or hard lumps.

In principle, however, all such gates are inferior to those of the undercut type and particularly to those which work on a pivot. In its simplest form such a gate is shown in Fig. 1. In opening, the curved plate drops as is shown by the arrow and the coal flows over the top edge. In closing the gate rises and either cuts off the flow partially at an intermediate point or completely when in the position shown in the figure. It is evident that no lump can ever stick this device, because it would be lifted by the upward movement of the curved plate

*Philadelphia, Penn.

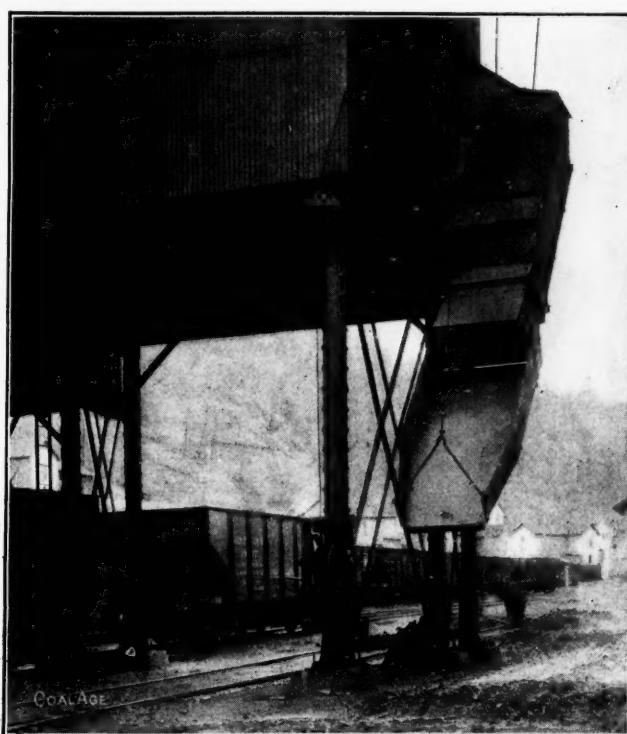


FIG. 2. "LOCAL COAL" CHUTE FITTED WITH GEARED GATE

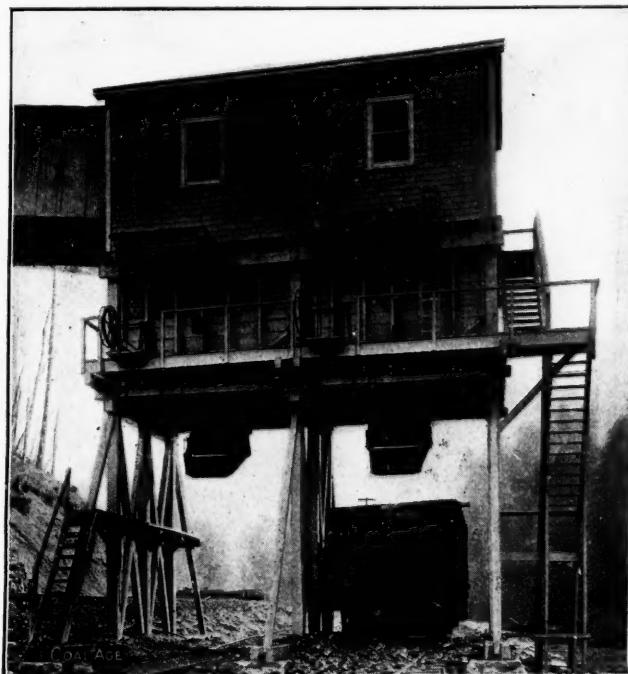


FIG. 3. RUN-OF-MINE LOADING BIN FITTED WITH TWO LARGE CHUTES

and for large gates the motion is geared for operation by hand chain or handwheel.

Fig. 2 shows a "local coal" chute fitted with a geared gate, and Fig. 3 shows a run-of-mine loading bin fitted with two large chutes. Here the lowering of the chute aprons and the opening and closing of the gates are all under the control of an operator on the elevated platform. This control is so accurate that the loader can deliver the coal at the rate of 20 tons a minute, or he can load the car to its limit by dropping the coal a bushel at a time if he pleases.

Fig. 4 shows the assembly of such a gate with its chute apron, and Fig. 5 illustrates a geared undercut gate set up on the front of a tipple. The cover plate over the chute is hinged and loose; it serves to keep the coal from becoming wet and frozen in cold weather, but it does not

prevent the gate from pushing lumps upward in the act of closing.

At some mines the disposal of rock is a serious problem. If it is put into a bin it is quite a job to get it out again. A large gate is a necessity in such a case.

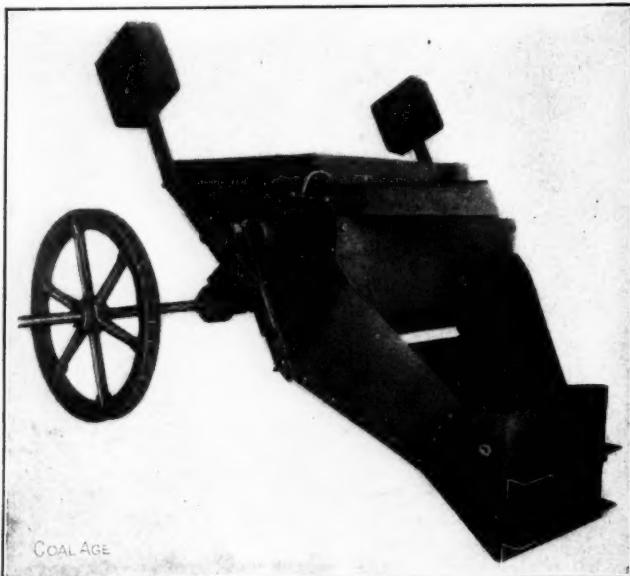


FIG. 4. ASSEMBLY OF GATE AND CHUTE APRON

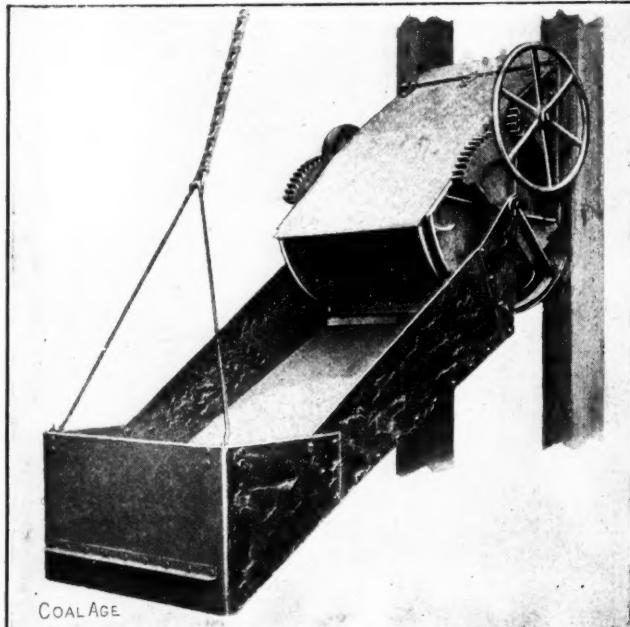


FIG. 5. GEARED UNDERCUT GATE FOR THE FRONT OF A BIN OR TIPPLE

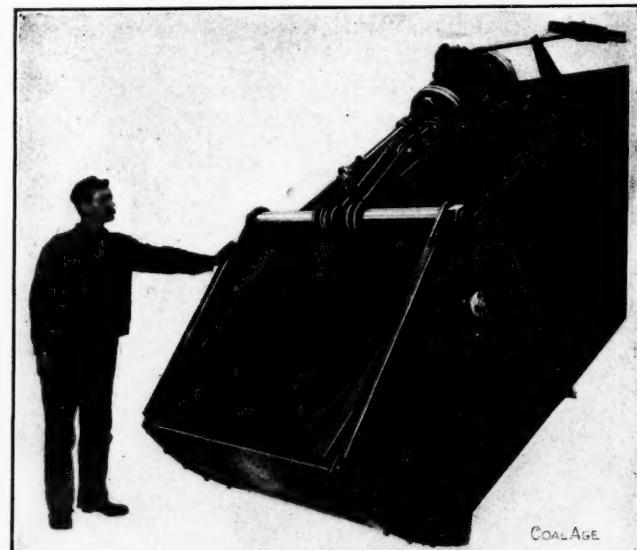


FIG. 6. A HEAVY STEAM-ACTUATED ROCK GATE

Fig. 6 shows a rock chute 54 in. square in cross-section with a steam-operated undercut gate attached. This is extra heavy in construction and will handle rock as big as a man's body. The gate is controlled by a small hand lever on a four-way valve and is quick and certain in operation.

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Mine-Inspection Service in Illinois

During the year 1883, a law was passed creating the office of state inspector of mines. Candidates for this office were required to furnish evidence satisfactory to the state mining board that they were citizens of the state, at least thirty years of age, and that they had a practical mining experience of ten years. All candidates were required to pass an examination to show what practical and technical knowledge they possessed of mine surveying; mining machinery and appliances; the proper development and operation of coal mines; ventilation in mines; the nature and properties of mine gases; the geology of the coal measures in this state; and the laws of this state relating to coal mines.

During the year 1911, the subjects of first aid to the injured and mine rescue methods and appliances were incorporated in the law; but this was the only change made in the law in twenty-eight years. During the same session of the legislature, a law was passed placing all state employees under the civil service rules. This included the state inspectors of mines. Although Illinois is not in the lead in coal production, it has taken an advance step in legislation over all other states in matters pertaining to mining and particularly to the method of appointing mine inspectors. Prior to this time, the inspectors were subject to the changes incident to a change of administration.

The inspectors are required to send to the Civil Service Commission monthly reports stating the number of

iarly called the Dean of the Service. Following are brief sketches of their careers:

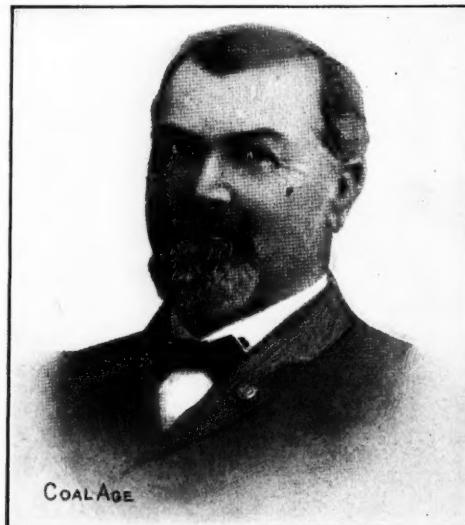
SKETCH OF WALTON RUTLEDGE

Walton Rutledge, inspector, 9th district, was born at Haswell, county of Durham, England, in 1835. At the age of 14 years he began working in the coal mines at that place. After about a year he was transferred to the surveying division, working with the mine examiners a part of the time. In 1854 he came to the United States, locating in the anthracite coal region, where he worked as a miner for two years. He came to Illinois, in 1856, and settled in Alton, which has been his home ever since. Here he worked in the mines until May, 1864, when he enlisted in company D, 133d regiment, Illinois infantry, as first sergeant. Afterward, in the same year, he raised a company which was mustered into the 14th reg-

now 67 years of age. He attended the schools in the mining districts of Northumbria until he was 13 years of age, when he commenced work in the collieries of the Bedlington coal company, going through the regular courses from trapper boy to miner.

Mr. Hudson came to the United States in 1871, locating at Henry, Marshall county, Illinois. After working two years in the coal mines at Galva, and operating a local mine at Henry, he moved to Streator, LaSalle county, where in 1873 he engaged with the Vermilion Coal Company, as a miner and remained in the employ of that company for ten years.

In 1883 the General Assembly passed an act creating the offices of state inspectors of coal mines in Illinois, dividing the state into five districts, also providing for the examination of candidates for inspectors, by a board of examiners. For some time previous to the passage of



COAL AGE

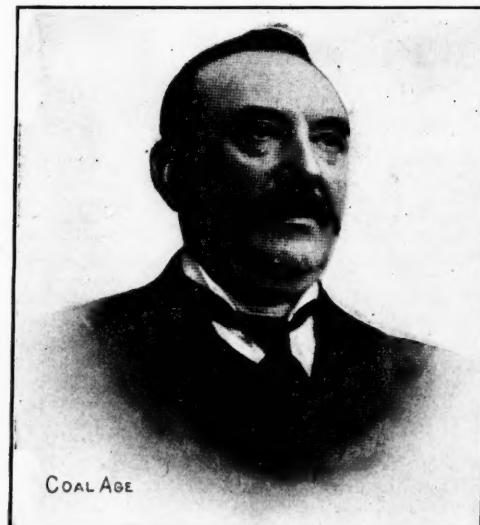
WALTON RUTLEDGE

iment, and served as first lieutenant to the close of the war of the rebellion.

At the close of the war he again went to work in the coal mines near Alton. At the same time he was chosen secretary of the Miners' Benevolent organization, embracing the states of Illinois, Indiana and Missouri, serving that organization for two years. During the session of the constitutional convention of 1870, he was active in securing a clause in the constitution providing for a police regulation for the coal mines of the state. In after years he was a member of a committee of miners to formulate a mining law for the state. After several attempts to secure such legislation he, with others, was finally successful in securing the passage of a mining law at the session of the General Assembly of 1879, but which provided for county inspectors only. In 1883, after the passage of the law creating State inspectors of coal mines, he passed, in the first examination for inspectors, and was appointed inspector for the fourth district. He was reappointed successively each term and held the position until 1894. In 1897 he was again appointed inspector, and is still serving in that capacity.

SKETCH OF THOMAS HUDSON

Thomas Hudson, inspector, 2d district, was born in the county of Northumberland, England, in 1846, being



COAL AGE

THOMAS HUDSON

this act, Mr. Hudson had been a close student of mining literature, and was fairly well versed in the technical as well as the practical knowledge of coal mining. At the first examination held by the board he successfully passed the examination, and was at once appointed by Gov. John M. Hamilton, as state inspector of coal mines for the second district. He at once transferred his residence from Streator to Galva, the latter being more centrally located in the district. Since 1883 he has been reappointed and commissioned by every Republican governor, and now holds a commission under Gov. Deneen.

The state of Illinois now ranks as third among the coal-producing states. In the year 1883, there were ten million tons of coal produced and twenty-three thousand employees in the mines, and five state inspectors were appointed at that time. At the present time, there are twelve state inspectors and the production for 1912 is over fifty-seven million tons and there are seventy thousand employees in the mines.

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By the use of steel in place of wood for mine timbering waste due to decay, framing and fitting, fire and insects is entirely overcome. Steel mine timbers also call for less excavation, cost less to erect, have a greater endurance and tend toward better ventilation. While the first cost of steel is nearly twice that of the wood used for timbering, the ultimate cost is lower, as steel lasts much longer. It can be used again and again and if crushed it has a salvage value.

EDITORIALS

Pyrite in Coal

The action of iron pyrite under heat is not clearly understood. It is commonly believed that when the bisulphide of iron is heated, half the sulphur is driven off but not nearly such a large proportion can be vaporized, at least, under commercial conditions. Valentine has shown that when pyrite is heated for one hour to 1832 deg. F. in the absence of air, it gives up only 26.27 per cent. of its sulphur while at the extremely high heat of 2599 deg. F., which would appear in a furnace fire as a bright white heat, 44 per cent. of sulphur is volatilized after 1 1/4 hr. of heating. Thus the desulphurization of pyrite is slow and halting.

But while in the absence of air, the sulphur is hard to drive from combination, in its presence, this is easily accomplished. If the pyrite is maintained at a temperature of 1832 deg. F. for one hour, 98.8 per cent. of the sulphur is lost whereas the same degree of heat and duration of time, as has been seen only removed 26.27 per cent. of it when the heating took place where air was excluded.

Hence in a furnace, the sulphur of the pyrite is almost certainly burned away before the compound is even approximated to a monosulphide, and the iron is available therefore, for combination with the lime and alumina to form a slag. Herbert Lang, the author of a book entitled "Metallurgy" writes us as follows: "It is generally held that pyrite ('brasses') of coal become oxidized during or soon after combustion and then certainly appear in the analyses as ferrous or ferric oxide." But he adds: "If the fire were urged at a rapid rate, it is likely that some part of the pyrite would be converted into ferrous sulphide and would appear in the ashes as matte, most probably as small spherical pellets. By vanning the ashes, these spherules might be discovered."

The question arises what is that combustion rate which would produce such a result and the answer is not forthcoming. There is need for a caution which is not always shown by those who argue on this matter. It is far preferable to be non-committal than dogmatic. The temperature, at which Valentine says 98.8 per cent. of the sulphur will be burned out in one hour is that declared by M. Pouillet to be a clear cherry red.

Mr. Lang, in his letter, adds that the intermixture of sulphur compounds whether ferrous sulphides or some other such bodies with whatever portion of the iron was oxidized would not interfere with the scorification of the latter and the formation of slag. This is the condition prevailing in the matting of roasted pyrite ores of lead or copper in a large way, where sulphur is usually left in the roast to the extent of 6 or even 12 per cent. The part not expelled in fusion goes to form matte and its presence does not prevent the forming of slag.

Hence we are not justified, until more exact information appears, in allying ourselves with those who have rejected vehemently the popular idea that pyrite is objectionable. It is *possible* and likely that when sulphur is

found in coal, and slag does not form, that the reason is that the iron is held as a sulphate and not in the weaker pyritic bond, but it would be obviously mistaken after what has been said to omit the word "possible" and to fail to grant that another viewpoint might be urged as a feasible working hypothesis. Some analyses introduced to defend the theory that pyrite is non-slagging appear more easily interpretable by the assumption that the sulphur is in the form of a sulphate.

♦

An Ultimate Analysis of Modern Labor Conditions

The labor unrest so strikingly in evidence, not only in this country, but throughout the world wherever industrial development has passed beyond the most primitive stage, is now openly regarded as a serious menace to the prevailing social system. A transitional period is at hand and there is no mistaking the trend of affairs.

Tangible evidence of these conditions is found on every hand—in the annual reports of our large corporations which almost uniformly comment on the situation; in the powerful lobbies by which labor is forcing the enactment of class legislation at the sacrifice of every other consideration, and even in the protracted revolution in Mexico, which is, after all, but a futile protest of the masses against the systems of peonage practiced in portions of that unfortunate country.

Capital is being forced into continually granting further concessions each of which is scarcely established before preparations for others are under way; nor does labor show any disposition to recede in times of commercial depression when the revenues of the large corporations are naturally depleted. Obviously such conditions cannot continue indefinitely and the issue *must* be met—sometime, somehow. What is the solution?

Unfortunately no feasible or practical solution has yet been advanced. But in a recent book* we find a clearer insight and a broader exposition of the basic evils responsible for prevailing conditions than seems to have yet been offered. The treatise is based on a series of articles in the *Daily Mail* written by H. G. Wells, an author of international reputation. These precipitated an almost universal discussion from able thinkers in all walks of life—business men of large affairs, labor leaders themselves, economists such as Messrs. J. Galsworthy and F. Harrison, the Duke of Marlborough and statesmen such as Earl Grey. The work is of such importance and so uniquely complete as to justify more than the ordinary review.

Mr. Wells takes the stand that the trouble is largely a psychological one, an imaginary evil, in fact a condition of the mind and hence must be dealt with as such. The situation is not new, except that labor is protesting against the fundamental conditions in our social system, rather than the mere question of hours and wages. The

*"What the Worker Wants."

proletariat is becoming more sensitive, critical and irritable, while with the wider diffusion of education, discontent is equally more diffusive, and as a result the unrest is more general and extended than in the past.

The most striking characteristic of the present-day situation is the close harmony that prevails between the different occupations, the existence of interlocking arrangements, by which the various organizations are being welded into one gigantic octopus. The trouble is most acute where the government is most representative and democratic; where minds are most alert, most intelligent and where industrial development is the greatest.

As to the actual causes of these conditions there is a great diversity of opinion. We find that Mr. Wells is inclined to shoulder much of the blame on the narrow views of the modern lawyer who resorts to unfair technicalities rather than resting his case on its true merits; in such encounters the laborer is usually beaten and hence arises a dissatisfaction and discontent that is deep-rooted and unforgivable.

In addition to this the representatives of labor in the government have been won over by the glamor of the other side and proved untrue to their trust. The representative form of government has been proved ineffective, and we find such men as the head master at Rugby and Canon Bannister, of Hereford, agreeing with the labor leaders that the present social system is unfair, unjust—and permanently so. It is even insinuated that the unrest is a moral issue for which the Church is, in a way, responsible.

One of the leading Socialists in England ascribes the trouble to the lack in purchasing power of money, the ineffective results obtained by the Labor Party, the increasing anxiety over the future and greater pressure of life. Another leading authority on industrial questions lays the disaffection to Socialistic legislation while workmen themselves write of a feeling of hopelessness that pervades the people because of the way they have lost their recent struggles. Others call attention to the change in the character of labor, which is tending towards a loss of individuality and hence creating a lack of interest and a subsequent dissatisfaction.

Mr. Galsworthy points out the evils of the fiduciary system (an essential part of large corporations) wherein the owner is displaced by a manager or agent; in his opinion this condition stands preëminently the first in the prevailing disturbance. There is no latitude granted the manager for the exhibition of generosity, even though the feeling be present, with the result that the relations between labor and capital have been reduced to a cold-blooded commercial basis. And, finally, the effects of the high cost of living are ably discussed by Professor Ashley of the University of Birmingham. He shows that the cost of foodstuffs increased 19 per cent. during the period from 1896 to 1910, while the advance in wages during this same time was only about 11 per cent. This he regards as the basic cause of all the disturbance, for the reason that it is chiefly felt on the home life and is uniformly in effect everywhere.

Coming now to the question of a remedy, we find equally divergent opinions. Mr. Wells demands a radical readjustment in labor conditions, which, as he pertinently points out, has never been done and is, therefore, all the more necessary. One of his chief plans is the provision of old-age pensions and it is a significant fact

that a number of the larger corporations are already seeking the good-will of their employees through this medium. It is, of course, obvious that a man's productive powers and effectiveness gradually develop until the maximum is attained, when it is equally clear that they must deteriorate.

Socialism is, of course, strongly advocated as a panacea of the prevailing troubles, and the exponents of this creed claim that salvation will only be obtained through "disciplined democracy." It is a significant fact, however, that such suggestions do not come from the workmen themselves. But all classes are agreed that there must be a radical readjustment in our social system and a closer understanding and more intimate relationship between the laborer and his employer.

Norman Angell pertinently reminds us that envy of the rich is not new, but boldly asserts that the representative form of government, "of the people, for the people and by the people" has been found impracticable and that this is the new condition which is responsible for all the trouble. He claims that it is an institution developed by conditions that have long since ceased to exist, such as the elimination of the oppressive political power exercised by the old-time monarchy. Now that such have been definitely relegated to the past, the instruments by which this was effected have become none the less obsolete and should likewise be abandoned. This system of government has been found effective in dealing with less intricate problems in rural districts, and even with those relating to capital crimes, but it has not been found so when called upon to decide the more complicated questions relating to credit, foreign competition, insurance, etc.

Coming finally to the question of resorting to violence, we find that both laborer and capital are agreed that such measures can only result in suicide. The stoppage of any vital function will not be tolerated and the party attempting to effect such a national calamity is facing immediate dissolution. Frederick Harrison ultimately sums up the situation with the statement that whatever the remedy, it must be one of gradual evolution; society, he thinks is far too complex, too strongly established, to be changed by any single remedy or by one revolution.

♦

Where an Accident Becomes Suicide

That coal mining is a dangerous occupation no one will attempt to deny. Were it not so the "safety-first" movement would never have been inaugurated. Nine-tenths of the accidents occurring underground, however, are unnecessary, and are the outgrowth of either ignorance or rashness, or both. And it would appear that we need look for no very substantial reduction in the loss of life in our coal mines until all men engaged in the industry have learned to avoid all danger wherever they possibly can.

Superintendents and foremen by exercising care and diligence in properly marking and labeling the points of known danger, may render accidents inexcusable, but hardly impossible. Regardless of how it may be classified in the record of mine, State or Nation, the death of a man who has deliberately crawled over or under or through a barricade or danger sign, is not in a true sense an accident. Such a death is little, if any, short of deliberate suicide.

Mixed Lights in Mining

BY J. T. BEARD

In presenting the next subject for discussion in COAL AGE, we have chosen one that is of greater importance in the prevention of mine explosions than is generally conceded or appreciated. That this subject is of widespread interest is amply demonstrated by the number of contributors that mentioned it, in response to our request made sometime since, asking that contributors should express their preference as to what subjects should be discussed next.

Attention has been recently drawn to the danger of using mixed lights in mines known to generate gas regularly or at intervals, from time to time, by the explosion that recently occurred in the Cincinnati mine. This was known to be a gaseous mine and safety lamps were used in all entries or headings where gas had been found; but, it is stated, the rooms in the mine were worked with open lights. The evidence given at the coroner's inquest suggests the conclusion that had safety lamps been used in the heading where the explosion started, the gas that accumulated in the brief time after the heading had penetrated a clay vein, would not have been ignited, and a great disaster would have been averted.

It is almost impossible to determine in advance when such irregularities will make their appearance and it is questionable, where gassy clay veins are found, whether open lights should be permitted under any circumstances. In the Pittsburgh district it has been customary to use open lights in rooms and then replace these with safety lamps, when the pillars are being drawn. Mining men from other regions have frequently criticised this practice, regarding it as dangerous. This open discussion will give all an opportunity to express their views.

Let us get busy and discuss this important question from a broad, practical standpoint, to determine the question of whether open lights should be used in *any* portion of a mine in which it is necessary to use safety lamps in other portions. In other words, is it safe, under any conditions incident to coal mining, to use "mixed lights," by which is understood the employment of open lights on roadways and traveling ways or in other portions of a mine in which certain sections generate sufficient gas that the use of safety lamps in those particular sections is necessary at all times?

From the standpoint of the mine inspector and the fire-boss alike, this question will probably admit of only one answer. These men are charged more particularly with the responsibility of maintaining safe conditions in the mine. The decision in reference to the use of safety lamps or open lights, depending as it does on the gaseous condition of the mine air and the possibility of gas being generated in dangerous quantities, is largely in the hands of the mine inspector, whose duty it is to see that the law is obeyed. The question is often asked: Is the mining law sufficiently specific in this regard, in any of the coal-mining states in this country?

From the standpoint of the mine operator, superintendent and foreman, the question has another bearing. It is recognized that the exclusive use of safety lamps, to a certain extent, reduces the output and increases somewhat the cost of the operation of the mine. The manage-

ment, however, almost without exception, regard the safety of the mine and that of the workers as the first consideration, and whenever they are convinced that the conditions demand certain requirements, these are invariably met without complaint.

From the standpoint of the miner the question of using an open lamp in preference to a safety, is one of convenience or, in many cases, reckless daring. Except under the strictest regulations and the rigid enforcement of discipline in the mine, the large majority of mine workers are willing to incur unwarranted risks in the use of an open light. The general attitude of the miner is to assume a place free from gas, unless he knows positively to the contrary. He is loath to take any precautions, under ordinary mining conditions, and will generally laugh at the one who expresses fear of a possible danger.

In the discussion of the question of mixed lights, let us have a frank, open expression of judgment and opinion, or we would rather say, conviction born of experience. Let us argue the matter from both sides, always having in view how far the question of safety must give place to convenience and economy in the operation of a mine. Let each contributor aim to present clean-cut, positive arguments in as concise a manner as possible. Let it be remembered that much of the force of an argument is lost by a superfluity of words and the lack of a strict adherence to the question at issue.

It is well to remember also that the mere expression of opinion, even though it be that of a practical man, with a thorough acquaintance of mining conditions, carries no weight unless such opinion is based on convictions that are the result of an intelligent experience. On the other hand, it is true that, owing to the lack of a sufficient knowledge of the theory and principles of mining, the experience of many good practical mining men has led to convictions that would have been different had they possessed the knowledge of those who have made mining a study.

In a few instances, contributors have allowed themselves to wander from the real point of discussion. When a writer does this he fails to arrest the attention and hold the interest of readers. We often hear good practical men, who are able to write and discuss any important mining question, make the excuse that they have not the time at their command. We have generally found, however, that the most successful men in all industries, including coal mining, are those who are never so busy but that they can find time to help in any effort made to advance the knowledge of their particular industry among the workers.

Good mine management requires that a reasonable amount of time and money should be regularly expended in the education of mining men and the advancement of mining. We hope these few words will appeal to all classes of mining men, from manager to miner, and that we shall have from them at the earliest possible moment, brief and concise statements of their convictions, based on experience. Let this discussion be one of the best that has been held in COAL AGE.

DISCUSSION BY READERS

The Education of the Miner

Does the coal miner really need an education, in order to become the best coal digger in the world? As a man begins to get a little education, he ceases to be a "coal digger" and wants to start "bossing," although he can earn more money by digging coal than by bossing. As a result, there is, in this country, probably not more than 5 per cent. of English-speaking miners. Under these conditions, the education of the miner means very largely the training of the foreign-speaking miner, and this can only be done by constantly talking and showing them both the right and the wrong way of doing things. No class of men needs education more, and it would seem that this country is just beginning to realize the fact.

I remember, a few years ago, in nearly all the mining villages in the North of England, mining classes were held under the auspices of the County Council. These classes were free to all mining students, and the course embraced all the subjects incidental to mining. It was a three-year course: the first year consisted of elementary work, the second year, more advanced studies; and the third year was devoted to honors work, for securing rank. The students who completed this course were in fair shape for taking any mine foreman's examination.

I have been much interested in the discussion as to whether textbooks should be used in examinations, and would say that, in my opinion, if this became the rule and textbooks were used, everybody would have the same opportunity. As far as I have observed, there are few questions asked in Pennsylvania examinations, requiring the use of textbooks; and a man with a good practical knowledge should be able to answer these questions from his own experience. I believe it is essential that a man should know something about the laws of ventilation and be able to use the formulas required for the solution of mining problems; but I do not think it is necessary for him to master algebra and the higher branches of engineering. In splitting air, practically, in the mine, a mine foreman's experience tells him where to place the regulator; and, after a few trials, he is able to obtain the required division of air.

Speaking of the education of miners, I have heard the remark made by a superintendent that it was a good thing that a man who had taken the examination "did not learn that he had passed, while he was in the mine, as his head would get so big that he would not be able to get out." My experience has been that the majority of men who take the examination know something of the practical side of mining, and the knowledge they have gained has not given them the big head, but rather the effect has been otherwise. I think much credit is due to the man who, by his own efforts, has gained sufficient knowledge to pass a mine foreman's examination. In my own opinion, practically all of our best men are those who have risen from the ranks.

THOMAS HOGARTH.

Heilwood, Penn.

Prizes for Efficiency

I was interested in reading of the prizes offered for efficiency by the Corona Coal Co., and H. B. Swoope & Co., COAL AGE, Feb. 8, p. 229. Fifty cash prizes were to be distributed among all classes of employees who showed their willingness to assist the work in every way possible. While this no doubt will prove an incentive to many workers and accomplish good results in some ways, the fact should not be overlooked that it presents a temptation to the men to violate some of the mining laws or the regulations of the mine when they know that no one is watching them.

More than once I have seen motormen run their motors faster than the law allows. Men will take risks and endanger not only their own lives but the lives of others, in order to bring their record up to the highest possible point. The prize system, in my opinion, presents a very strong temptation to unscrupulous men to do many things that they should not do, and may often result in accidents that will cost the company much more than is to be gained through the extra amount of work done.

J. E. HOMME.

Ellsworth, Penn.

The Coking Qualities of Coal

Some time since my attention was drawn to the necessity of crushing coal in preparing the same for coking, by an article entitled "Preparing Coal for the Coke Ovens," COAL AGE, May 3, p. 683. In this connection, I desire to make the following remarks in regard to testing samples of coal to ascertain their coking qualities.

It has been the custom in some places to test coal, in this respect, by sending a nail keg full of the slack to the nearest coke plant, where it is placed in an oven, covered with the usual charge of slack and drawn out later when the oven is cool. Where this method has been used, however, it is needless to say that it has been found unsatisfactory, as the sample is far too small to give a correct indication.

When it is desired to ascertain whether the coal of a certain seam will coke satisfactorily, at least two car-loads of the coal taken from different parts of the mine, should be shipped to the coking plant, so as to enable at least two ovens to be run on this coal. If the result shows that the coal, as "mine run," does not yield a satisfactory coke, it is well to grind 40 or 50 tons to slack and again try the coking test. It has been found that many coals that will not coke, as "mine run," or when the product contains lumps of considerable size, will produce an excellent coke when powdered or crushed to a more or less uniform grade. When this is found to be the case, the treatment of such coal, in coking, will involve the question of installing grinding or crushing and elevating machinery at the mine.

In some cases, it may be desired to ship the lump coal, and coke only the slack or the screenings. In this

case, enough coal should be mined to furnish a carload of screenings for the test; and this will give a very good idea of the quality of the coke to be obtained when the plant is in complete operation. A true estimate of the coking qualities of screenings cannot be obtained by grinding mine-run coal; because the slack and screenings, in the operation of the mine, always contain a larger percentage of impurities than is true of mine-run coal.

If the analysis of the trial lot of coke shows too high a percentage of ash and sulphur, for the purpose for which the coke is to be employed, it may still be possible to obtain a satisfactory coke, by first washing the coal. To determine the possibilities in this case, a carload of slack should be sent to the manufacturers of coal-washing machinery; and then passed through their experimental plant. The washed coal should then be sent to the coke ovens; and, in many cases, the resulting coke will then be found to come within the prescribed limits of purity.

As a general rule, it requires one and one-half tons of coal to make one ton of coke; and, since ash is not removed in the process of coking, a coal containing 6 per cent. of ash should yield a coke containing about 9 per cent. At times, when the analysis of coke shows more ash than might be expected from the analysis of the coal it may be due to the excess of impurities in the slack, owing to insufficient care in mining. This can generally be

avoided, wholly or in part, by the exercise of proper care on the part of the miners, or by the adoption of improved methods of mining.

The amount of sulphur and phosphorus in a seam of coal will often vary widely in short distances. Inasmuch as the coke required in a blast furnace must not only contain a low percentage of impurities, but must present a uniform composition, such a variation of these objectionable features must be carefully investigated in the mine. Coke employed in the manufacture of iron, to be used in the Bessemer-steel process, must generally not exceed 10 per cent. ash, 1 per cent. sulphur, 0.02 per cent. phosphorus. A coke of uniform composition, although approaching these specified limits of impurities, is more desirable as a fuel than one averaging very much less but having a variable composition that may unexpectedly run higher than the specified percentages of these impurities. The ash and phosphorus in coal are not removed during coking, but about one-third to one-half of the sulphur is volatilized during that process and, allowing as before, one and one-half tons of coal to 1 ton of coke, a coke containing 6.5 per cent. of ash, 0.75 per cent. to 1 per cent. sulphur, and 0.013 per cent. phosphorus should yield a coke within the Bessemer limits.

GEORGE STOCKDALE, Supt.,
Hogsett Coal & Coke Co.

Percy, Penn.

Study Course in Coal Mining

By J. T. BEARD

The Coal Age Pocket Book

3. What pressure, in pounds per square inch, corresponds to a head of 200 ft of water?

Solution—

$$p = 0.434 h = 0.434 \times 200 = 86.8 \text{ lb. per sq.in.}$$

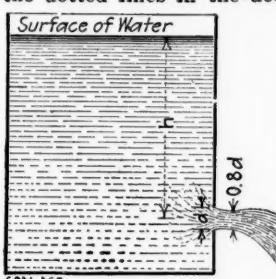
4. What head in feet of water column corresponds to a pressure of 50 lb. per sq.in.?

Solution—

$$h = 2.3 p = 2.3 \times 50 = 115 \text{ ft.}$$

FLOW THROUGH ORIFICES

When water or other fluid, including air, flows through an orifice of comparatively small size there is always a crowding of the streams of flow toward the orifice, as indicated by the dotted lines in the accompanying figure. This crowding or converging of the stream lines toward the orifice naturally causes a contraction of the sectional area of the flowing particles, a short distance outside of the opening, as shown in the figure. The contraction is greatest at a distance from the orifice about equal to its diameter. In order that the sides of the vessel may not interfere with the converging lines, the distance of any side from the edge of the opening should not be less than 2.7 times its diameter or width.



SHOWING VENA CONTRACTA

Theoretical orifice is a hole in a thin plate, and the diameter of the contracted vein, in that case, is found to be 0.8 of the diameter of the hole. This makes the sectional area of the flow, at that point, $0.8^2 = 0.64$ of the area of the orifice. The ratio of the contracted area to that of the orifice is called the "coefficient of contraction." It varies with the style of orifice employed.

Quantity of Efflux or Discharge—The quantity or volume of the discharge, per unit of time, depends on the velocity of efflux, as determined by the head or pressure producing the flow, and the sectional area of the contracted vein (vena contracta). From this fact, it appears that the velocity due to the head or pressure is only attained at the point where the contraction of the vein is greatest. The velocity at the orifice, in a thin plate, is reduced in the ratio of the coefficient of contraction, and is therefore about 0.64 of that of the contracted vein.

Owing to the resistance met by the streams of flowing particles as they crowd the orifice, the velocity, even at the point

The Coal Age Pocket Book

of greatest contraction, is slightly less than the theoretical velocity due to the head, or say 0.97 of that velocity. This latter is called the "coefficient of efflux."

In order to calculate the quantity of flow (Q), for any head (h) it is necessary to combine the coefficient of efflux with the coefficient of contraction. Thus, for the flow through an orifice in a thin plate, $0.97 \times 0.64 = 0.62$ is the true coefficient of discharge. For any area (A) of the orifice in a thin plate, the area (a) of the vena contracta is $a = 0.64 A$; and the velocity at this point, for any head (h) is $v = 0.97 \sqrt{2gh}$. Therefore the quantity of discharge is

$$Q = a v = 0.62 A \sqrt{2gh}$$

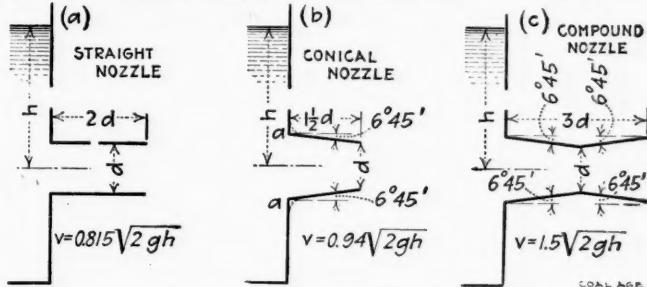
Seeing that the value of gravity (g) is given in feet per second, the head of water (h) must also be expressed in feet, and the area (A) in square feet, then the quantity (Q) will be found in cubic feet per second. The flow or discharge through an orifice having any area (A) in square inches, and for any head (h) in feet and any coefficient (c) of discharge, may be found by the following formulas:

$$Q = 3.342 c A \sqrt{h} \text{ cu.ft. per min.} \quad (1)$$

$$Q = 25 c A \sqrt{h} \text{ gal. per min.} \quad (2)$$

$$Q = 1500 c A \sqrt{h} \text{ gal per hr.} \quad (3)$$

Effect of Nozzle to Increase Flow—By adding a mouthpiece or nozzle to the opening, as illustrated by the accompanying diagram, (a), (b) and (c), it has been found pos-



SHOWING EFFECT OF NOZZLE TO INCREASE FLOW

sible to greatly reduce the contraction of area and increase the flow through the orifice. By thus adding a short straight tube, as shown at (a); or the conical spout shown at (b); or the compound mouthpiece at (c), the velocity of discharge becomes respectively, 0.815, 0.94 and 1.5 times the theoretical amount.

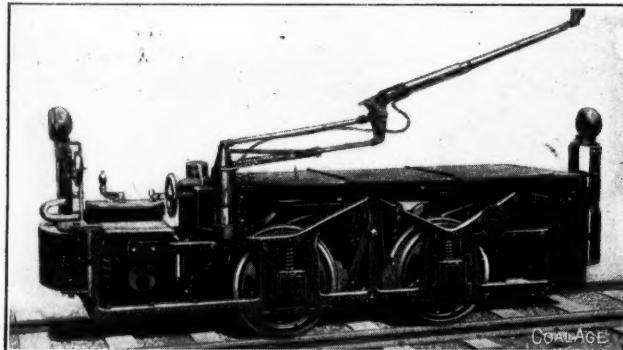
A New Locomotive Trolley Pole

The ordinary single trolley pole as employed on mining locomotives has many disadvantages and is subject to many limitations. When operated where the height of the trolley above the rail varies considerably the pressure exerted between the trolley wheel and wire also varies. This causes poor contact at the higher wire levels and extreme pressure with consequent rapid wear of wheel and harp at the lower levels.

When the wire hangs low and the pressure between wire and wheel is great if for any reason the latter leaves the wire the trolley pole strikes the roof or other obstructions with considerable violence, often causing damage.

Particularly in coal mines where the conditions of roof or overhanging rock is such that narrow entries are necessary, it is often impossible to run one of the single-pole trolley locomotives on account of an inability to reverse the trolley, because of the narrowness of the heading.

Where high cars are used and the trolley wire barely clears them, difficulty is sometimes experienced from the



SIDE VIEW OF LOCOMOTIVE WITH NEW TROLLEY POLE

trolley pole striking on the top of the car immediately following the locomotive. Furthermore with the ordinary single-pole trolley, the wheel will not follow any considerable transverse variation in the position of the wire.

To overcome these difficulties, the Westinghouse Electric & Mfg. Co. of East Pittsburgh, Penn., have placed upon the market the compound or semi-pantograph motion, trolley pole illustrated herewith. The principle advantages claimed for this device are the following:

(1) The variation in contact pressure for different trolley-wire heights is much less than that obtained by a standard single-pole trolley.

(2) Short length of trolley pole permits of its being turned around in a narrow passage.

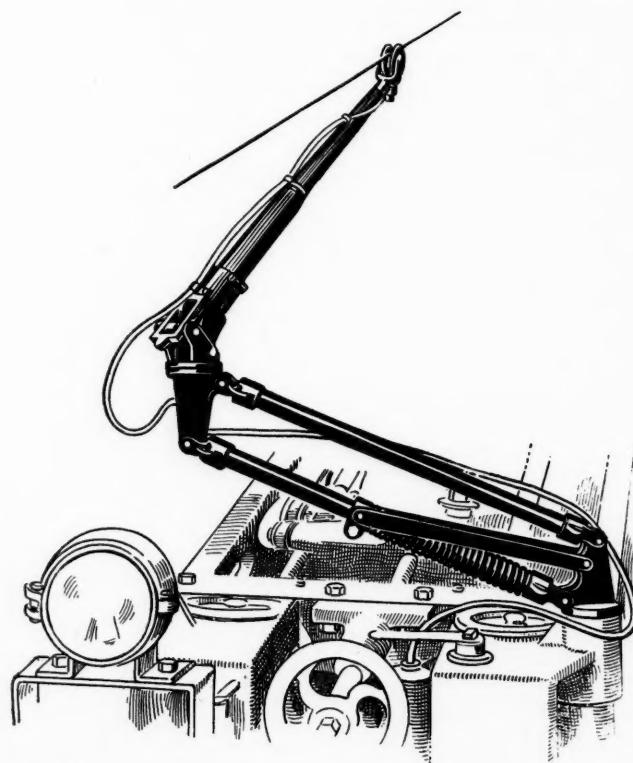
(3) The trolley does not interfere with high trailing cars on sections where the trolley wire is low.

When the wire is at a height of five feet from the top of the rail the trolley-wheel pressure is approximately 26 lb. while at the height of 11 ft. it is about 18 lb. This shows a variation of 8 lb. in a range of 6 ft. which is much less than can be obtained by a single-pole trolley.

The new pole can be turned around in a passage from 4 to 6 ft. in width with the socket located approximately in the center of the locomotive. It will operate successfully where the trolley wire may have a variation in its location from the center of the track on which the

locomotive is running of 4 ft. to the right or left without change of location of socket on the locomotive itself. This also does away with the necessity on gathering locomotives of two trolleys, one on each side.

The trolley consists of two members which operate in sockets. By means of a latch or pin at the locomo-



LOWER PART OF TROLLEY SWUNG ACROSS LOCOMOTIVE,
AVOIDING NECESSITY FOR TWO SOCKETS

tive socket the lower member can be adjusted vertically and kept in a rigid position and also can be swung horizontally and fastened in any definite place required. Furthermore it can be attached to locomotives now in service.

Coal in Alsace-Lorraine

The quantity of coal mined in Alsace-Lorraine has increased in the 40 years from 1872 to 1912 from 290,206 to 3,538,722 metric tons of 2204.6 lb., the output for 1912 being almost triple that of 1902. Coke was produced to the amount of 94,595 metric tons in 1912, against 90,275 tons in 1911, in addition to the coke used at the mines. The following byproducts were also recovered in 1912: 4250 metric tons of coal tar, 1208 tons of ammonium sulphate, and 967 tons of benzol, against 4577, 1175 and 787 tons, respectively, in 1911. Of the 3,538,722 tons of coal yielded from the mines of Lorraine in 1912, 197,475 tons were used in the works for heating the offices, firing the boilers, etc., against 221,456 tons in the preceding year. The sales amounted to 3,341,247 tons, a gain of 18.8 per cent. over 1911.

Because of its smokeless character, producer gas is destined to become an important factor in the elimination of the smoke nuisance.

EXAMINATION QUESTIONS

Ventilation, Pumping and Surveying (Answered by request)

Ques.—A slope dips one foot in 12 ft., for a distance of 756 ft., measured on the incline. What is the difference in elevation between the mouth and face of the slope, and what is the horizontal distance between these two points?

Ans.—From the reading of the question, the distance being measured on the slope, we assume the dip is one foot vertical, in each 12 ft. of slope measurement. This gives a total vertical fall, from the mouth to the foot of the slope, of $756 \div 12 = 63$ ft., which is the difference in elevation between the mouth and the face of the slope.

The horizontal distance between the same points is

$$\sqrt{756^2 - 63^2} = 753.37 \text{ ft.}$$

Ques.—A seam dips 4 in. per yd. of horizontal measurement. What is its angle of inclination?

Ans.—A dip of 4 in. per yd. is 4 in. in 36 in. of horizontal measurement, or one in 9 in. The angle (a) of inclination of the seam is, then found as follows:

$$\begin{aligned} \tan a &= \frac{1}{9} = 0.1111 \\ a &= 6^\circ 20' \end{aligned}$$

Ques.—How many horsepower will it take to raise 60,000 gal. of water up a shaft 250 ft. deep, in one hour? The resistance of pumps and pipes is 25 per cent.

Ans.—The weight of a single gallon of water is 7.48 lb. The total weight of water lifted per hour is, therefore, $60,000 \times 7.48 = 448,800$ lb., or 7480 lb. per min. Adding 25 per cent. to this weight for the resistance of the pumps and pipes, we have $7480 \times 1.25 = 9350$ lb. Since this weight is lifted through a vertical height of 250 ft., the work performed each minute is $9350 \times 250 = 2,337,500$ ft.-lb. The effective horsepower required for this work is, therefore, $2,337,500 \div 33,000 = 70+$ hp.

Ques.—An entry 5x10 ft., and 10,000 ft. long, is driven through a hill from daylight to daylight. If a large fan, say 20 ft. in diameter, placed at the mouth of this entry, circulates 100,000 cu.ft. of air per minute, what will be the water gage on the fan drift? There is no air course, but the air circulates in a single current from the intake to the discharge opening.

Ans.—In this case, the total length of the air course is 10,000 ft.; the perimeter $2(5 + 10) = 30$ ft.; and the area $5 \times 10 = 50$ sq.ft. The rubbing surface is $10,000 \times 30 = 300,000$ sq.ft. The water gage producing this circulation is calculated in the usual manner; thus,

$$w.g. = \frac{0.00000002 \times 300,000 \times 100,000^2}{5.2 \times 50 \times 50 \times 50} = 92 + \text{in.}$$

Note—Such a water gage is never attained in practice. It is due here to carrying the air in a single current, at the high velocity of 2000 ft. per min., a distance of nearly two miles.

Ques.—If the length of an airway is doubled, how will this affect the power; the velocity and the area of the airway remaining the same?

Ans.—The formula for power, expressed in terms of the velocity of the air current, is

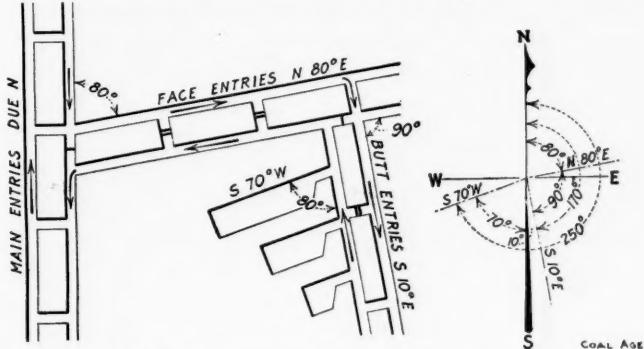
$$u = klov^3$$

It is observed from this formula that, for a given velocity produced by a given power, the *area* of the airway is not concerned. Assuming the cross-section of the airway remains unchanged, the perimeter (o) is constant, and k and v being constant, the power (u) varies as the length (l) of the airway. Therefore, to produce the same velocity of the air current when the length of the airway is doubled, the power must also be doubled.

♦

Ques.—(a) If the course of a main entry is due north, what is the course of a face entry turned off to the right, at an angle of 80 deg.? (b) What is the course of a butt entry turned off the face entry to the right, at an angle of 90 deg.? (c) What is the course of a room turned off the butt entry, at an angle of 80 deg. to the right?

Ans.—(a) In the accompanying sketch, the general position and direction of the main entries, face entries, butt entries and the rooms turned off the butt entries are



PLAN OF MAIN, FACE AND BUTT ENTRIES, AND DIAGRAM SHOWING THE CORRESPONDING AZIMUTHS

shown. The course of the main entries being due north and the face entries being turned to the right an angle of 80 deg., the course of these entries will lie in the northeast quadrant, as shown on the right of the figure, and its bearing is N 80° E.

(b) The butt entries being turned 90 deg., again, to the right, the azimuth of their course is $80 + 90 = 170$ deg. Since this azimuth lies between 90 deg. and 180 deg., the course of the butt entries lies in the southeast quadrant. All bearings in the southeast and southwest quadrants being estimated from the south end of the meridian, the angle of bearing, in this case, is found by subtracting the azimuth from 180 deg. Thus, $180 - 170 = 10$ deg. The bearing of the butt entries is then S 10° E.

(c) The rooms being turned 80 deg. to the right of the butt entry, the azimuth of the rooms is $170 + 80 = 250$ deg. Since this angle lies between 180 deg. and 270 deg., the course of the rooms lies in the southwest quadrant, and the angle of bearing measured from the south end of the meridian is $250 - 180 = 70$ deg. The course of the rooms is, therefore, S 70° W.

SOCIOLOGICAL DEPARTMENT

State Miners' Hospital at Fairmont, W. Va.

BY A. W. HESSE*

SYNOPSIS—The state of West Virginia has provided three hospitals for its miners of which that at Fairmont is one. It accommodates 49 patients. Those injured at their regular employment are admitted free.

♦

By an act passed by the state legislature of West Virginia, during the session of 1899, three hospitals were

brick; the roofs are of slate. The partitions are built of studding, lath and plaster; the walls are covered with hard plaster filled and finished with paint.

The ground floor has two wards, each having 11 beds and three wards, each accommodating three beds. On the second floor there are nine rooms in each wing each containing one bed. So in all there is provision for 49 patients at one time. The second floor of the main building is for the living and sleeping rooms of the officials, nurses and other employees. Convenient bath and toilet rooms are located on both floors of the main building and wings. The office rooms are in the main



THE FAIRMONT HOSPITAL FOR MINERS, ERECTED BY THE STATE OF WEST VIRGINIA

created for the free care of those accidentally injured. These, designated as Miners' Hospitals Nos. 1, 2 and 3, were located at Welch, McKendree and Fairmont, respectively.

The site for the Fairmont hospital was donated by the people of that city. It consists of an acre of ground on a gently sloping knoll, easy of access and about four blocks from the Baltimore & Ohio R.R. station. Paved walks and roadways lead to and around the property.

DESCRIPTION OF BUILDING

The building consists of a main section and two wings, one at each end extending back 48 ft. The walls are of red brick and the corners finished with buff shale

building and occupy the ground floor being on the left of the building and facing the front. The operating, preparatory and sterilizing rooms are across the hallway in the rear of the main building and on the left of the same. The kitchen is between the wings to the rear of the hallway and easy of access for the serving of trays to patients. The large well-lighted dining room in the rear center is for the officials and nurses.

The stable has a stone foundation, red brick walls and corners finished to correspond with the main building. It is seen to the right of the hospital as shown by the front view herewith.

Both buildings are plumbed for gas and water. Electric light and power are furnished by a plant located in the basement of the hospital building.

*Assistant chief engineer, Consolidation Coal Co., West Virginia division, Fairmont, W. Va.

THE POWER PLANT

The generating equipment consists of a 20-hp. Bessemer gas engine driving a 13.2-kw. dynamo and a 5-hp. Bessemer gas engine driving a 2.3-kw. dynamo. A deep-well pump driven by a 3-hp. motor supplies the operating plant, and with the tank and air compressor thrown into use will supply the institution in case of emergency. The refrigeration plant is in a 7x10 ft. room in which a 3 hp. motor drives a one-ton Brunswick compressor.

All laundry work for the institution is done in the building, the laundry being equipped with three large slate tubs with hot and cold water, large hot and cold mangles and a large rotary washer driven by a 3-hp. motor.

FREE TO THOSE INJURED AT WORK

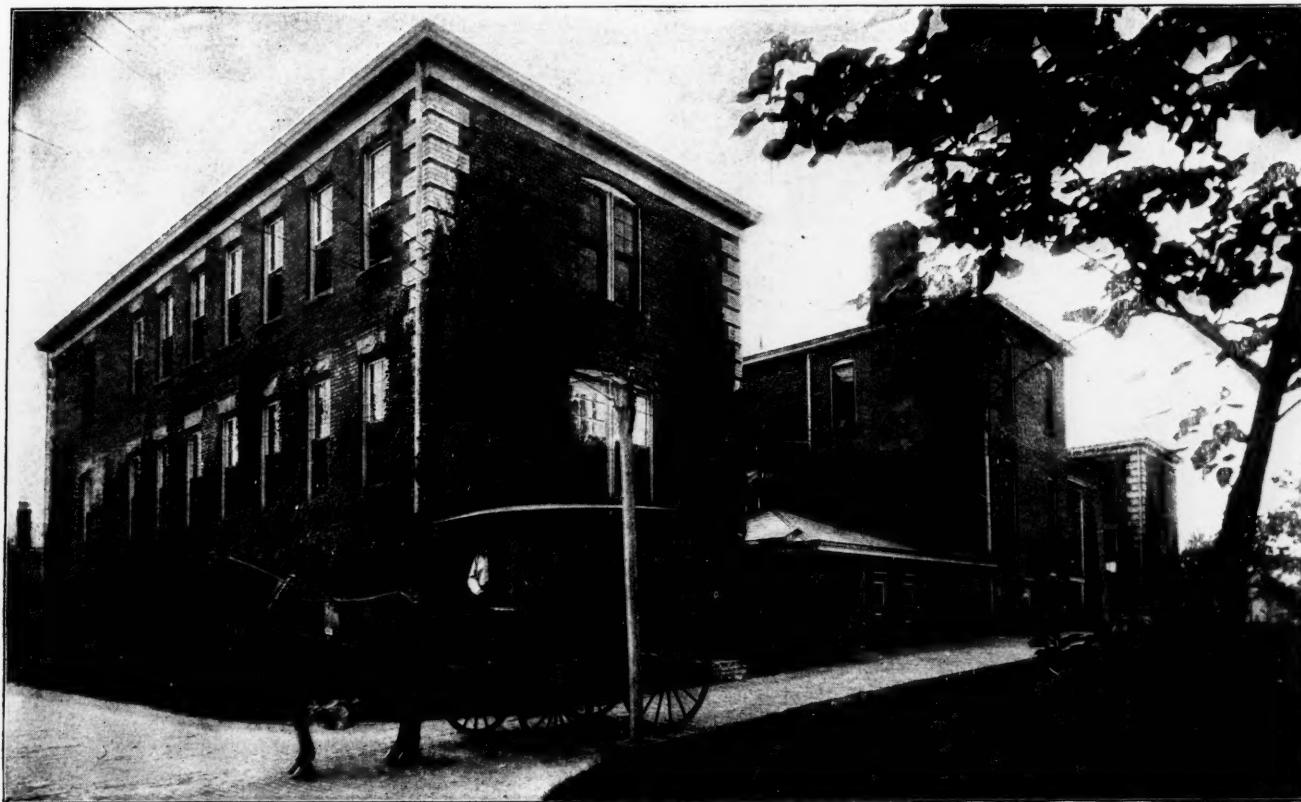
The act creating these hospitals provides, "That it shall be the duty of the board of directors of each of

CLASSIFICATION OF INJURIES

For the eleven fiscal years ending Oct. 1, 1912, the admitting diagnoses were about as follows:

Injury	Per cent.
Fractures.....	40
Wounds.....	30
Contusions.....	18
Burns.....	6
All other.....	3
Fractures and dislocations.....	2
Dislocations.....	1
	100

Of the last 1176 cases of fracture treated, 59 per cent. were simple fractures, 20 per cent. were comminuted compound fractures, 18 per cent. compound fractures and 3 per cent. comminuted fractures. Of these fractures 37 per cent. occurred in the tibia and fibula, 14 per cent. in the femur, 6 per cent. in radius and ulna, 5 per cent. in the skull and the balance scattered in small percentages. Seventy per cent. of all the injuries were incurred in the mines. Up to about 1911, perhaps 53 per cent. of these



REAR OF HOSPITAL, SHOWING WINGS AND CENTRAL BUILDING, LATTER CONTAINING KITCHEN AND ROOMS FOR OFFICIALS

these hospitals to admit under their rules and regulations persons requiring hospital care and to treat free of charge persons accidentally injured in the state, while engaged in their regular employment or occupation; preference at all times to be given to persons accidentally injured."

Since this hospital was opened, Oct. 1, 1901, the law governing admission to this hospital has been closely observed and the entries for the eleven following years numbered 2838 or an average of 258 per year. During the year 1910-11, 323 were admitted, this being the largest number since the institution was opened. Besides these cases requiring hospital care, an average of 600 dressings for wounds were performed each year.

accidents at the mines were due to coal and slate falls and those due to cars ran about 6 per cent. During 1911 and 1912 the accidents due to falls decreased to about 40 per cent. while those due to cars increased to about 35 per cent.

When this hospital was opened in 1901, Dr. James McDonald was placed in charge and has maintained the position as superintendent since then. His staff consists of an assistant superintendent, matron, two nurses, four assistant nurses and two graduate nurses. With this force he has carried on a charitable as well as an economical work successfully and the hospital has amply supplied a much felt need.

Some time ago a careful classification of fractures was made with the following results:

NATURE OF FRACTURES TREATED AT FAIRMONT HOSPITAL

	Simple Fracture	Comminuted Fracture	Compound Fracture	Comminuted and Compound Fracture	Both Comminuted and Compound Fracture	
					Total	Per cent.
Clavicle.....	56	0	1	15	57	5.28
Femur.....	134	2	15	15	166	15.37
Fibula.....	13	1	1	..	15	1.39
Humerus.....	24	7	8	5	44	4.07
Ilium.....	19	..	6	2	27	2.50
Ischium.....	7	..	..	1	8	0.74
Malar.....	2	..	..	2	4	0.37
Maxillary inferior.....	19	..	..	6	25	2.30
Maxillary superior.....	1	..	3	2	6	0.55
Metacarpal.....	..	..	1	1	2	0.19
Metatarsal.....	13	..	2	1	16	1.48
Nasal.....	..	..	1	1	2	0.18
Patella.....	9	..	..	2	11	1.02
Radius.....	1	..	..	1	2	0.19
Radius and ulna.....	37	4	14	12	67	6.20
Ribs.....	54	..	..	..	54	5.00
Rib penetrating lungs.....	..	..	41	..	41	3.80
Pubes and femur.....	..	..	..	1	1	0.09
Sacrum.....	2	..	..	..	2	0.18
Scapula.....	9	2	..	..	11	1.02
Skull.....	15	..	27	18	60	5.55
Sternum.....	8	..	..	..	8	0.74
Sympysis pubes.....	7	..	..	..	7	0.65
Tarsal.....	..	..	..	1	1	0.09
Tibia.....	3	..	..	..	3	0.28
Tibia and fibula.....	204	21	49	162	436	40.40
Vertebra.....	2	..	1	..	3	0.28
Frontal and nasal.....	..	..	1	..	1	0.09
	639	37	171	233	1080	100.00
Per cent.....	59.17	3.43	15.83	21.57	100.00	100.00

The classification of the contusions and wounds is too extensive for this paper to be omitted.

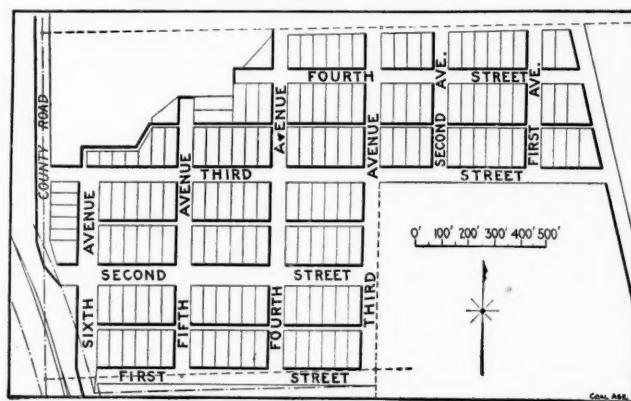


Coal Valley Mining Co.'s Village

The Coal Valley Mining Co.'s village at Matherville, Ill., is an evidence that miners are in many cases desirous of purchasing their own homes. In the spring of 1909,

lot was sold and two additions have had to be made since.

Good houses, the greater number of which cost from \$700 to \$2800, were built by the purchasers. Most of them were constructed for the mine workers owning them by contracting concerns which furnished all material complete above the foundations; lumber, paint, hardware, roofing, etc. The architecture is pleasing and above the average of that of mining towns.



VILLAGE OF MATHERVILLE, ILL., AS ORIGINALLY PLOTTED

The streets are now being graded and filled with cinders. A good brick school building was erected last year, as well as several churches. The plots for these were donated by the coal company.

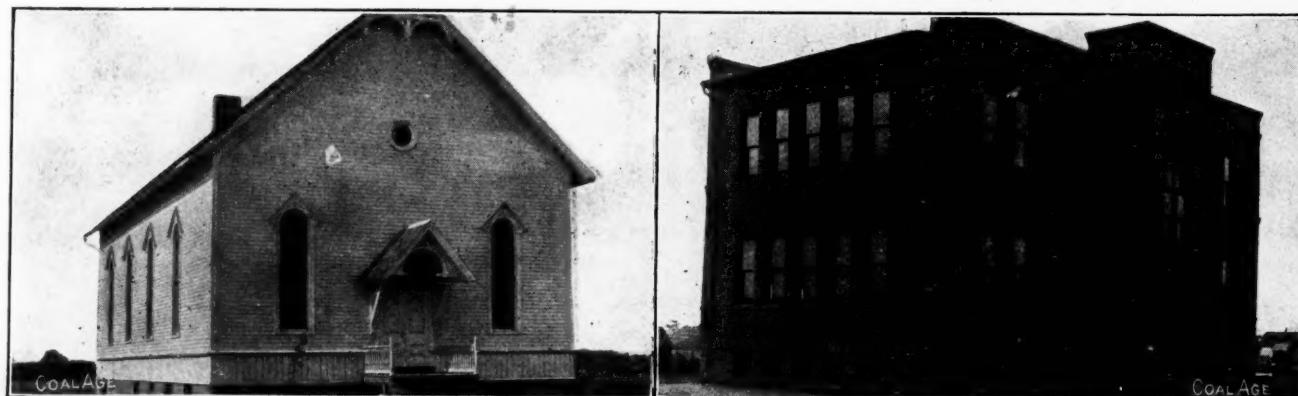
The town is lighted by electricity supplied by the cor-



MAIN STREET

THIRD STREET

GENERAL VIEW



METHODIST EPISCOPAL CHURCH

VILLAGE OF MATHERVILLE, ILL.

the company laid out a townsite of 150 lots near the line of the Rock Island Southern Ry. about a mile from the mine, and sold the lots under certain restrictions, prohibiting the sale of liquor, reserving the mineral rights thereunder, etc. The prices of the lots varied from \$125 to \$175 for a 50-ft. front and in each case they were paid for in cash. In less than one year every

poration, which operates the electric railroad, and a movement has been started to erect water-works. Since the town was laid out several additions have been made by outside parties and by the Alden Coal Co.

Many of the southern Illinois mines are similarly not equipped with miner's houses, the workers being owners of their dwellings and not tenants.

COAL AND COKE NEWS

Washington, D. C.

The situation produced by the action of the Senate in undertaking to investigate the West Virginia coal strike conditions seems to become more and more serious daily and to involve more and more collateral issues which had hardly been expected to be drawn into the discussion.

During the past week sharp clashes have occurred on the floor of the Senate with reference to this matter while in the process of working up the investigation itself there has been serious difficulty and friction, and in the coalfields the question of prosecuting various men responsible for the mining difficulty or supposed to be so has become involved with the enforcement of the Sherman anti-trust law.

The fact that President John P. White with eighteen officers of the United Mine Workers were indicted in the Federal District Court at Charleston, West Virginia late last week is tending to complicate the situation greatly, particularly as the Department of Justice disavows having instigated or directed the proceedings. It is now stated that if the prosecution of these men is pushed it will be taken as a direct order on the part of the President while if dropped it will be construed as indicating that the President is in sympathy with the terms of the proviso in the Sundry Civil bill now pending, which forbids the use of the funds for the prosecution of combinations of labor in defiance of the Sherman anti-trust law.

Unofficial reports from West Virginia make it appear that the charges against the nineteen labor men are more serious than the technical violation of laws against conspiracy in restraint of trade ordinarily involved in widespread strikes. While indictments so far have been returned only against mine workers affiliated with the labor union, it is hinted that coal operators—not miners—in Ohio, Indiana and Pennsylvania are regarded as co-conspirators with the union men.

According to these reports, the operators in Ohio, Pennsylvania and Indiana wanted to see the unions recognized in West Virginia, wages increased, and the cost of West Virginia coal advanced to a point where these fields could not compete in the markets coveted by the operators in the other states.

If this connection between the union men and the coal operators is established and the operators also are indicted the whole aspect of the case will change. In such a circumstance it is believed, the sympathies of union labor might be on the side of the prosecution. It would not then be a trial of labor men as such. It would be a prosecution of certain laborers charged with conspiring with certain operators to restrain trade.

The proviso in the Sundry Civil Appropriations bill which caused President Taft to veto the measure was reinserted before the bill was reintroduced at the present session. At that time it was said that President Wilson had reason to believe that so many Democrats were committed to the exemption that even if he threw his influence against it many Democrats would support it and party harmony would be imperiled.

The Production of Anthracite Is Large

Information received here by Government officers shows that the production of anthracite coal during the current spring is going on rapidly. The information has been communicated to members of Congress who have been threatening more investigation to the coal situation and has apparently served to mitigate their disposition to be active in regard to the matter. According to the official statements now current about 6,000,000 tons of coal were mined during May while slightly more than the same amount was consumed.

In May of last year the mines were closed about two-thirds of the time pending the wage settlement, and the total production of coal in that month was but 1,429,000 tons. At the close of May, 1912, after nearly two months of strike the loss in tonnage, as compared with the first five months of 1911, was 9,188,893 tons. This year the production in May shows an increase of 4,566,385 tons over last year, and for five months an increase of 8,976,474 tons. From this time on the production of anthracite coal will compare, until the end of the calendar year, with the largest output ever reported.

Every company, of course, showed a remarkable increase as compared with the output in the strike month of last year. Reading increased 922,000 tons, the Lehigh Valley, 988,000 tons, and the other companies proportionately.

From these figures it is being argued that there will be an unusually heavy aggregate output of coal for the current calendar year, the demand being large up to the present time while stocks are unusually low so that a large production is necessary to replenish the fundamental supplies.

Another Supreme Court Decision

The Supreme Court of the United States in a decision handed down on June 9 closed the long-standing litigation between the International Coal Co. and the Pennsylvania Railroad with reference to shipments of coal by holding that the company could not collect a rebate from the railway owing to the fact that no definite damages had been proven to exist so that a fixation of the damage in money terms was out of the question. The full text of the decision will not be ready for several days.

PENNSYLVANIA

Anthracite

Seranton—United Mine Workers from Scranton to Pottsville in the three anthracite districts held a large demonstration, May 30, at Mt. Carmel in the dedication of a handsome monument to the memory of the late D. F. Gallagher. Mr. Gallagher while a member of the State Assembly introduced a bill known as the Miners' Certificate Law. This law requires a person entering the mines to work as a laborer two years before he can engage as a miner.

The Temple Iron Co. has dissolved in conformity with a decree of the U. S. Supreme Court. This announcement has been made at its main offices June 5.

Wilkes-Barre—The 500 striking employees of the East Boston colliery of the W. G. Paine Co. in Luzerne, have returned to work. During the strike which lasted several days the company took the opportunity to make some necessary repairs. The men whose refusal to join the Union caused trouble have at last affiliated themselves with that organization.

Giovanni Ettor, the organizer of the Industrial Workers of the World, who figured so prominently in the Lawrence strike, is expected to come to the anthracite coal fields on the 10th of this month, to remain for a period of at least 15 days, and possibly a month. He will be accompanied by a Polish organizer and the two will endeavor to arouse interest among the foreign element of the mine workers in the organization of I. W. W. locals throughout the entire Scranton, Wilkes-Barre and Hazleton regions. Already one strike has been caused by the efforts of the I. W. W. organizers to get a foothold in territory which the U. M. W. of A. regard as their field, and there promises to be even more serious trouble should the two become embittered.

Shamokin—On June 6 rescuers equipped with oxygen helmets saved the lives of 23 miners in the Scott Colliery, following a gas explosion. Two men were killed. Fire followed the explosion but it was extinguished without any further fatalities. The colliery is operated by the Susquehanna Coal Co. an adjunct of the Pennsylvania R.R.

Bituminous

Pittsburgh—The American Mine Safety Association will hold its first annual meeting at Pittsburgh in September. A national button bearing the red circle signifying danger and the white arrow pointing the way to safety has been adopted by the society. This society is the outgrowth of the National Mine rescue and first aid conference held in Pittsburgh last fall. It has a membership of 250 and its purpose is to preserve the lives and health of miners and to reduce property loss.

Connellsville—The boiler house at the Colonial No. 4 mine of the H. C. Frick Coke Co. was recently destroyed by fire. The loss is estimated at \$15,000.

Workmen in the Cincinnati mine of the Monongahela River Consolidated Coal & Coke Co. have found another victim of the explosion which occurred April 23. This brings the total death list up to 97.

Barnesboro—The tipple of the Lennox Mine of the Hastings Coal & Coke Co. was destroyed by fire June 2. About 100 miners will be temporarily thrown out of employment.

WEST VIRGINIA

Charleston—After a long conference with representatives of the United Mine Workers and coal operators in the Paint Creek and Cabin Creek fields, the Senate Committee is preparing to investigate West Virginia strike conditions and hearing began at Charleston June 10.

The trouble at the four mines of the New River and Ohio Coal Co. at Stanford has been satisfactorily adjusted and the mines resumed work June 6. The trouble arose when the company refused to allow a check weighman on the tipple.

Out of a class of 112 who took the examination for first-class certificates for mine foremen and fire bosses at Welch, May 20, 21 and 22, 11 received first-class certificates, 35 second-class certificates and 3 passed the examination for fire boss.

NEW JERSEY

South Amboy—According to decisions rendered by Supreme Court, taxes running into thousands of dollars will be collected by the city of South Amboy on coal of the Susquehanna Coal Co. and other companies which use coal storage yards at this place. The Court holds that the coal is not in the process of interstate shipment, and has come to rest as a part of the property within the State.

OHIO

Yorkville—After a mass meeting held June 2, 300 miners in this vicinity refused to return to work until Italians and Poles, who have been loading coal, were discharged. These nationalities have a deadly feud, and several battles have occurred inside the mines. Other miners fear that a battle may be started, which will endanger the lives of all under ground.

Martins Ferry—The miners at the Rush Run No. 2 Mine went out on strike June 5 because new mules had been put into service to haul the coal out of the mine. The 300 men employed declared that the new mules could not haul the coal fast enough, and that they were losing time as a result. Officials of the company sent the old seasoned animals back to the work.

Woodsfield—State Mine Inspector J. C. Davies states that he does not agree with all the findings of Coroner Elmer Radcliffe of Noble Co., on the recent explosion in the Imperial Mine at Belle Valley. The coroner states that the explosion was caused by gas coming in contact with an open lamp of one of the miners, and that the gas was forced down upon the men by a change in the course of air brought about by the removal of a brattice and the closing of a door a few minutes before the explosion occurred. Inspector Davies says the closing of the door had no effect on the explosion, and that the real cause was the failure to maintain proper air courses, which allowed the gas to accumulate.

INDIANA

Vandalia—The validity of the wide mine entry law of Indiana, requiring that the entrance to a coal mine must be kept clear of débris, was recently upheld by the Supreme Court of the United States in a decision in a suit brought by Charles E. Barrett, as agent of the Vandalia Coal Co.

ILLINOIS

Marissa—The Egyptian Coal & Mining Co. has voted a new issue of bonds for \$50,000 to purchase the Meek mine at Marissa. All of the mines of the Egyptian Coal & Mining Co. are at the present time on the Illinois Central, but when the Southern Traction Co.'s line is completed that will also connect with them all.

Marion—The Watson Coal Co., with two mines northwest of Marion, has gone into voluntary bankruptcy. One of the mines has not been working for several months, on account of being flooded when the high waters prevailed in southern Illinois.

The Pittsburg Big Muddy Coal Co., operating a mine at Pittsburg, a few miles east of here, has been declared a bankrupt. The cause given is that it is impossible to market the coal at a profit, and that such conditions have existed for several months.

KANSAS

Pittsburg—John Steele, Kansas state arbitrator, has announced that the miners of No. 14 District of the United Mine Workers are right in their contention with the Cherokee-Pittsburg Coal & Mining Co. This means that the

miners shall not be compelled to push their loaded cars a distance exceeding 150 feet. Mr. Steele has decided that since No. 14 is a new mine, it comes under the contract made between the miners and operators last year. Some of the other mines of the coal company are operated under old contracts, which allow a distance of 200 feet.

WYOMING

Sheridan—A severe electric storm, in the vicinity of Acme, May 28, caused a blaze which completely destroyed the power house of the Model Coal Co., entailing a loss estimated between \$15,000 and \$18,000. The building was entirely destroyed, together with much valuable machinery.

FOREIGN NEWS

Vancouver, B. C., Can.—Sixty-one miners brought from England to work in the coal mines at Nanaimo have refused to serve as strike breakers and are being cared for at the local headquarters of the United Mine Workers of America.

PERSONALS

A. T. Shurick of the editorial staff of "Coal Age" is the 4500th member of the order of Kokoa.

Governor Ammons of Colorado has reappointed James Dalrymple as chief inspector of coal mines.

F. L. Natt has tendered his resignation as manager of the Rock Island Fuel Co., of Moline, Ill. He expects to enjoy a short vacation and then enter into business for himself.

J. W. Finney, of Hartford, Mo., has resigned his position as commissioner for the Southwestern Coal Operators Association of Missouri, Kansas, Oklahoma, Arkansas and Texas. T. A. Freese, of Huntington, Ark., has resigned his position as State Mine Inspector, to succeed Mr. Finney.

Wm. Nicholson, who for the past four and a half years has been district mine inspector for the eleventh district has tendered his resignation to the State Mining Department, to take effect June 15th. Mr. Nicholson will assume the superintendent's duties for the Jewell Ridge Coal Co. at Richlands, Va.

Fred S. Green, of Byesville, Ohio, has been made superintendent of the Imperial Mine at Belle Valley, in which 15 miners lost their lives by an explosion two weeks ago. Mr. Green succeeds Harry Dudley, who was held responsible for the explosion by Coroner Radcliffe. Mining in the Imperial mine will be started at once.

Rowland Jones, of Avoca, who has been employed as assistant mine foreman at the Thomas Shaft, Butler Colliery, Hillside Coal & Iron Co., has been transferred to the position of foreman at the Courtright Slope, of No. 14 Colliery, Pennsylvania Coal Co., at Plainsville. He takes the place of foreman Shovlin, who was killed by a fall of rock a few weeks ago. Walter Hutchinson, assistant foreman at the Clarence Colliery, has been transferred to the Thomas Shaft, to fill the vacancy left by Mr. Jones.

CONSTRUCTION NEWS

Mora, W. Va.—The American Coal Co., of New York, is constructing mines in this vicinity, together with a model company store and office building, at a cost of \$20,000.

Punxsutawney, Penn.—The Lindsey Coal Mining Co. has work underway on a new opening about three miles from Punxsutawney. It is expected that they will be ready to begin shipments by Aug. 1.

Craig, Colo.—A party of Eastern capitalists is planning on making investments in coal lands in Moffat County. It is understood that these lands will be placed in readiness for extensive operation by Oct. 1.

Connellsville, Penn.—Extensive improvements have been made by Lochrie Bros. Coal Co. at their Argentine, Butler County, plant. The daily output has been increased by nearly 150 tons, and the capacity now reaches 600 tons.

Two Harbors, Minn.—It is rumored that the city of Two Harbors will soon ask for bids for the construction of a coal

trestle to be built near the City Water & Light station, and to be used by the city in hauling coal by the cargo.

Bloomington, Ill.—Officials of the Big Four Coal Co. have received word that the contract has been let for a new coaling station at Lilly, to be erected at the cost of \$10,000. This contract has been awarded to the Roberts & Schaefer Co., of Chicago, Ill.

Connellsville, Penn.—It is reported that the activities of the Maryland Steel Co., which is planning the erection of 120 new coke ovens, will soon be broadened to take in the manufacture of structural steel. About \$3,000,000 will be spent on improvements.

Blairsville, Ohio—It is reported that the Buffalo, Rochester & Pittsburgh R.R. is to be extended from Josephine, through Blairsville, to Latrobe. It will cross Conemaugh River by a long trestle. A surveying corps is said to have been working out a plan of extension for some time.

Pound, Va.—Several hundred men are at work on the construction of the upper Pound River extension of the Indian Creek & Pound River R.R. from Pound, along and continuous to the Kentucky border line, in Wise County, Va., which will tap rich coal and timber fields controlled by the Tidewater Lumber Co.

Henry, Ill.—The Santa Fé R.R. has recently purchased 10,000 acres of coal land in the vicinity of its station at Toluca. The Santa Fé company is now sinking coal shafts and putting in machinery to develop this field. It is expected that this will be a source of fuel for its system in Illinois, Iowa and Missouri.

Cincinnati, Ohio—In the electrification of its lines in the Pocahontas coal district the Norfolk & Western R.R. will build its own special generating station. Several large firms interested in this class of work have been figuring on the construction. The generating station will have a 24,000-hp. capacity and will be located in the middle of the Pocahontas coal district.

Monongahela, Penn.—Engineers of the River Coal Co. are making locations for a borehole to be driven to the coal in the Cincinnati mine. This will enable to West Penn Electric Co. to run a power line to furnish electric current to run the mining machinery. The West Penn Co. expects to have connections made with all the mines of the coal company within a short time.

Huntington, W. Va.—It is reported that W. A. Liller, of Keyser, has been awarded the contract for \$250,000 worth of houses to be erected for the Pond Creek Coal Co., at their operations in Pike County, Ky. This contract calls for the erection of 420 houses of modern construction. Many of them will be finished with baths and other conveniences. Each house will contain from five to six rooms.

Unionville, Mich.—A new shaft for the Handy Bros. Mining Co., near Unionville, has been sunk to a depth of 81 ft. in 12 days. The work has been done under the supervision of John Morris and William Williams. The entire depth of the shaft is to be 200 ft. The coal is of the Pennsylvania bituminous character, and it is understood that the territory will warrant mining operations for approximately 20 years.

Connellsville, Penn.—The Connellsville Coke & Fuel Co. is rushing the construction of 80 new ovens at their plant in the Ligonier Valley and have the railroad from their plant at the Marietta-Connellsville Coke Co.'s works almost graded. The new works will be modern in every respect and will be equipped with a compressed air coke drawing and loading machine, which is being built at the Scottdale Foundry & Machine Co.'s plant.

Denver, Colo.—Announcement has been made that the Colorado Fuel & Iron Co. will spend \$500,000 in improvements on the Pueblo plant this summer. These improvements will consist of the installation of three open-hearth furnaces, which will be completed in about six months. These furnaces will increase the output of the mill approximately 20 per cent., and will mean the addition of more than 100,000 tons to the annual output of steel of the company.

Sykesville, Penn.—Work on the improvements at the Cascade Coal & Coke Co.'s plant is progressing rapidly. The new smokestack has been completed. The structural iron workers, who will do the iron work on the power house, have arrived and are now in shape to push their part of the construction to a finish as fast as the material arrives. The foundations for the power house are now practically completed. Work on the new ovens is well under way, much of the masonry having been already completed.

Bluefield, W. Va.—The Baltimore & Ohio R.R. Co. proposes to erect another coal railroad in Kentucky. It has acquired the charter rights of the Long Fort R.R. Co., which

owns a location on the left bank of Beaver Creek. The new road, when completed, will connect with the Chesapeake & Ohio Ry. As a result of the construction of this line, there will be about 1000 acres of coal land owned by the Elkhorn Fuel Co., which will be developed. No date has yet been decided upon for starting the construction of the proposed line.

Washington, Penn.—The Chartiers Mining Co., which recently purchased a large block of coal territory in Mt. Pleasant Township, has accepted the surface of three farms on which the new openings will be made, together with other developments to establish the new mining town. The sum of \$25,000 was paid for a total of 264 acres of surface land. The coal rights were purchased at the rate of \$135 per acre. No active operations will be started toward the development of this block for a year or so, owing to the fact that the company is making extensive improvements in other sections of the county.

NEW INCORPORATIONS

Boston, Mass.—The Atlantic Coal Co.; capital stock, \$500,000. Incorporators: P. D. Dean, J. B. Sullivan, Jr., W. G. Todd.

Medora, N. D.—The Western Coal Co.; capital stock, \$60,000. Incorporators: L. H. Hallin, M. S. Mitchell, J. T. Roysten.

Portland, Me.—The Brookline Coal Co.; capital stock, \$25,000; to carry on a wholesale and retail coal business. E. A. Randal, president.

New York, N. Y.—The Von Bauer-Lively Coal Products Co.; capital stock, \$1,000,000. Incorporators: G. G. Stiegeler, E. F. Hellings, W. M. Pyle.

Charleston, W. Va.—The Elmo Mining Co.; capital stock, \$50,000; chief works, Elmo, W. Va. Incorporators: R. M. Price, R. S. Stilman, D. W. Hill, A. C. Collins, Buckner Clay

Charleston, W. Va.—The Wheeling Monroe Coal Co.; capital stock, \$25,000; to operate in Monroe County, Ohio. Incorporators: J. B. McKinley, M. A. Hanning, H. P. Lockwood, L. W. Brown and H. O. Wells.

Anchor, Ky.—The R. C. Teway Mining Co. has been incorporated with a capital stock of \$10,000, by R. C. Teway, E. B. Teway and W. F. Burnwinkle, for the purpose of developing a small property in that vicinity.

Leslie, Ark.—The Red River Coal & Mining Co. has been organized here with a capital of \$100,000, to develop the 14-in. seam of coal near here. The officers are: G. S. Thompson, president; Edward Mays, vice-president, and A. G. Killibrew, secretary and treasurer.

Springfield, Ill.—Hickman Williams & Co., of Louisville, Ky., have been licensed to incorporate in Illinois. The capital stock is \$600,000. To buy and sell pig iron, coal, coke, alloys and steel and iron products; and to own and operate glass furnaces, coke plants, coal and ore mines, and steel and iron works.

INDUSTRIAL NEWS

Roanoke, Va.—The Heuser Coal Co. has purchased 300 acres of coal and timber land on Pine Creek, near Mayking, Ky., and will develop the same within a short time.

Maracaibo, Venezuela—Development on a limited scale has been begun by the Caribbean Coal Co., an American organization, on the coal deposits on the Guajira peninsula. A diamond drill is being forwarded to the property.

Grand Haven, Mich.—A large deposit of coal has been discovered on the beach in this vicinity by a gang of workmen who were putting in the new water main.

Shelburn, Ind.—The Canada Oil Co., which is drilling on the farm of Thomas Dix, has recently shot a well at a depth of 615 ft. From all indications, it will produce from 50 to 60 bbl. a day.

Paducah, Ky.—The West Kentucky Coal Co. will begin at once the construction of 50 new barges at its plant, for the purpose of taking care of its increasing production. Since Jan. 1 the company has built 47 barges, but requires still more.

Hulbert, Ark.—Last week the Roberts & Schaefer Co. secured a contract from the Rock Island Lines for a fireproof counterbalanced bucket (Holmen type) coaling station, to be built immediately at Hulbert, Ark. Contract price approximately \$15,500.

Morgantown, W. Va.—J. V. Thompson, of Uniontown, Penn., has failed to purchase several valuable tracts of coal land in this county upon which he secured options some time ago. The options were for 45 days and have expired. It is understood that the price ranged from \$600 to \$800 an acre.

Lynn Hollow, Ky.—The Lynn Hollow Coal Co. was recently organized by local men on the new Washto & Black Mountain R.R. in the Harlan field. This is another new company which is starting development work on a large scale, with promise of large production later on.

Burkburnett, Tex.—The Corsicana Petroleum Co., which has purchased the lease on 3600 acres of land in the Burkburnett oil field will bore a number of wells upon the property. There is already one well which has a production of more than 100 bbl. per day located upon the land.

Monongahela, Penn.—It is reported that leading operators of the Pittsburgh district have refused orders for 1,000,000 tons of coal during the past week or ten days, owing to the fact that they were already sold to capacity. Indications are that the mines will run steadily during the entire summer season.

Lexington, Ky.—The miners' short course which is given by the State University College of Mines and Metallurgy is proving exceedingly popular with miners, and many additions to the class which will take the course during the summer have been made, the students coming not only from all parts of Kentucky, but from other states as well.

Louisville, Ky.—A 2,000,000-bushel coal fleet arrived in Louisville a few days ago from Pittsburgh, principally intended to supply the local yards for the summer storage business. Large tows of empty barges were awaiting the arrival of the towing steamers of the fleet, to be taken back to Pittsburgh for immediate loading for the South.

Denver, Colo.—J. G. Gwyn, chief engineer of the Denver & Rio Grande Ry. Co., Denver, Colo., has just awarded a contract to the Roberts & Schaefer Co. for the building of two large counterbalanced bucket (Holmes type) locomotive coal-loading stations for installation on their line at Salida and Minturn, Colo. Contract price approximately \$22,500.

Sargent, Ky.—A large acreage of coal and timber land on Smoot Creek has been purchased by A. H. McClure and associates, of Frankfort, Ky., and it is intended to develop the property at once, for which purpose a complete coal-mining plant will be opened up shortly. Subsequently lumber mills will be installed for the purpose of cutting up the timber.

Harlan, Ky.—The Harlan Coal Mining Co. is taking bids on lumber to be used in the construction of 120 miners' houses which it proposes building at its mines. They will be of a little better class than the average run of such houses, as a good grade of yellow pine is to be used for the most part, and cypress shingles will be used in the roof, instead of tin or composition roofing.

Johnstown, Penn.—Mine No. 33 of the Pennsylvania Coal & Coke Corporation, at Patton, resumed operation June 2, after having been closed down for three months. The company now has about 100 men at work and is putting out about 300 tons daily. The capacity of the mine is about 1200 tons. It is said that the company is driving new headings in preparation for a rush in the coal business next fall.

Boonville, Ind.—The Big Four Coal Co. has secured an option on several hundred acres of coal land and is completing arrangements for large stripping operations in Southern Indiana. A company, which will include the Big Four company, together with outside capital, is now being formed to mine this coal by a stripping process. It is claimed that the output will reach a thousand tons daily and the company expects to be able to put the coal aboard the cars for 20c. a ton.

Owensboro, Ky.—Announcement has been made of an increase of 5c. a ton on coal from the mines in western Kentucky, on the Louisville & Nashville, after June 1. A similar increase has been ordered, also, upon the Illinois Central. The reason for the increase on the part of the Louisville & Nashville has not been given, but it is understood that the step has been taken to equalize the rates from western Kentucky mines with those from the mines in southeastern Kentucky.

New Cumberland, Penn.—The Monongahela River Consolidated Coal & Coke Co., which has lost two boats on the Ohio River, near Louisville, within the past month, suffered the loss of another a few days ago when the towboat "Tornado" struck Dam No. 9, on the Ohio River, near New Cumberland, and sank. The boat was on her way to Pittsburgh

with a tow of empties when the current and high water combined to cause the accident. The crew of 28 men escaped by leaping into the river as the boat went down. It will probably not be possible to recover her.

Salt Lick, Ky.—The Licking River R.R. Co., which has been operating a 32-mile line running from Salt Lick to Yale, in Bath County, has filed notice in the office of the Kentucky Railroad Commission of its intention to quit business. The road served a region which showed considerable promise of coal and timber, but operations have evidently not proved profitable. The company has a capital stock of \$50,000, and is bonded for \$100,000. Stockholders holding 497 of the 500 shares filed the notice, these including J. H. Fulmer, Jr., W. W. Hubbard, H. G. Niles, Jr., J. A. Roper and Charles Bygate.

Lexington, Ky.—J. B. Allen, who is in charge of the Slempp-Camden-Mayo coal interests in Perry, Knott and Letcher Counties, Ky., proposes to conduct an elaborate and exhaustive system of prospecting over the properties which he handles during this summer, and for that purpose recently secured the services of Henry L. Noel, a member of next year's graduating class of the Kentucky University College of Mines and Metallurgy. It is intended to ascertain exactly what the properties are worth for coal-mining purposes, in order that development may proceed intelligently when it begins.

Beaver Creek, Ky.—The charter of the Long Fork R.R. Co., which owns a location for a railroad on the left fork of Beaver Creek, and whose proposed line will render accessible about 100,000 acres of coal lands owned by the Elkhorn Fuel Co. and about 8000 acres owned by the Milwaukee Coal & Gas Co., has been acquired by the Baltimore & Ohio R.R. Co. The latter company will proceed with the construction of the line, although the exact date of the beginning of the work has not been decided upon. F. L. Stuart, of Baltimore, Md., is chief engineer of the Baltimore & Ohio. The road will be about 30 miles in length.

Jenkins, Ky.—It is reported that the Consolidated Coal Co. has now increased its output to the point where it is shipping 200 cars a day from its mines at Jenkins and 60 cars from the McRoberts workings; and the output from the latter is to be doubled within two weeks. This largely increased output has necessitated the operation of more and larger trains over both the Sandy Valley & Elkhorn and the Lexington & Eastern railroads in that section. The Louisville & Nashville is rapidly getting into service in this field its new steel coal cars recently provided for, and is doing everything in its power to meet the increasing requirements of the coal operators.

Columbus, Ohio.—The Chapman Mining Co., of Columbus, which has offices in the Wyandotte Bldg., is branching out and has established sales agencies at a number of points. At Mason City, Iowa, L. B. Hagerman has been stationed and A. M. Fisher is located at Detroit. W. H. Spencer is stationed at Grand Rapids. In addition to these agents the company has assigned A. S. Tingley to cover Indiana and A. L. Vogt to cover the state of Ohio.

Arrangements have been made with the New York & New England Coal Co., of Albany, Penn.; the Nayaug Coal Co., of Dunsmore, Penn., and the Mohawk Coal Co., of Carbondale, Penn., to act as selling agency in this territory.

Louisville, Ky.—The Kentucky Court of Appeals has granted to the Illinois Central R.R. Co. an order restraining Judge J. J. Rice, of Muhlenberg County, from proceeding with the trial of the 1600 damage suits filed by the miners in that section against the railroad on account of last winter's car shortage. One of the reasons alleged for the issue of the order was that Judge Rice is a candidate for reëlection, and that the number of plaintiffs involved in the suit might influence him. The amount involved in the cases is \$50,000, and the appellate court holds that they should be tried in the circuit court, from which an appeal may be taken to the appellate court, in order that the full merits of the matter may be adjudicated.

Stonega, Va.—The Virginia Iron, Coal & Coke Co., which operates large coal and coke plants at Stonega, Va., two miles from the Kentucky line, has announced that it is about to start the biggest operation ever attempted in the Virginia coal fields. The new development will be along the headwaters of Guests' River for seven or eight miles along the Kentucky line, and will be reached by the Interstate R.R., the company line, which is to be extended from Norton, Va., for that purpose. For years it has been the company's intention to develop this part of its property, and it is now ready to spend in the neighborhood of \$25,000,000 in the work. The construction of the railroad has begun, and engineers will soon locate the first town of the series which will be built in connection with the operation.

COAL TRADE REVIEWS

GENERAL REVIEW

The retail demand for hard coal is the best it has been for years at this season, which has enabled dealers to buy more liberally than usual. Shipments by the companies are steady and promise to continue so. There is a perceptible tendency to drag, however, and stove coal which has been the leader for several months is now comparatively easy, with broken a close second.

Some bituminous shippers in the East are so short of coal that they are being forced into the open market for small tonnages to fill out their contracts. This is a most unusual condition for this season of the year when the market is ordinarily at the lowest point. The inadequate labor supply is probably the direct cause of this condition, but the situation has been further aggravated by a heavy buying movement on the part of some consumers seeking to cover their requirements against a possible further advance in quotations. The Eastern bituminous trade is in a commanding position with the market steadily strengthening, and indications are that there will be a further shortening up in tonnages unless the labor situation improves. Forced sales, even in the low grades, are practically unknown; coal is to be had only on reasonable notice, while operators are slow about taking new business and there is a general feeling that higher prices will prevail later.

Mining in the Pittsburgh district continues active, although consumers are well taken care of on contract. The labor supply is inadequate, but not sufficiently so as to seriously affect operations and there appears to be sufficient car supply to take care of shipments; slack is the only heavy feature of the market. In outlying districts the car shortage is becoming more pronounced, particularly where prompt shipment is required. The asking price is stiff and there is no difference of opinion regarding the firm condition of the market. Operators are well sold up for several months and there is little prospect of any increase in the production.

Although the car shortage in Ohio is restricting operations, it is now evident that the lake shipments will exceed all previous records. There is still a shortage at the Hampton Road piers, and some producers are having difficulty in meeting their contracts; the dumpings at the piers fell off last week, due principally to a lack of tonnage. The Southern markets remain steady, because of the light production, as a result of a scarcity of both cars and labor.

The wave of prosperity in the coal trade now seems to have been definitely established in the Middle Western markets. Contrary to expectations, the trade continues to improve and it is now clear that there is little danger of any immediate slump in quotations. Prices are advancing because of the shortage of Eastern coal, which is forcing buyers into the Middle Western markets. Some large contracts are open and operators are showing a tendency to hold for higher prices.

BOSTON, MASS.

Bituminous—Pocahontas and New River continue quite firm in price. Some of the shippers are even short of coal for early June loading and are in the market themselves to buy of other interests at the contract figure. This is a most unusual situation for June and it points to a strong market through what is ordinarily the slow season. The far-sighted people in the trade are expecting such a shortening up of tonnage on account of the poor supply of labor in most of the districts that they are trying hard to pile up coal as fast as it can be had. There is no accumulation at any of the loading piers and the demand from the West is reported as unusually brisk. In all directions bituminous is in a commanding position.

It is significant that a further slowing up is apparent on the Georges Creek tonnage coming to tide. Steamers at Baltimore are having fair despatch, but sailing vessels and barges are now required to wait for a few days at least. At Philadelphia and New York the receipts are just beginning to be intermittent. The same is true of the highest-grade coals from Pennsylvania.

Cargoes arriving on the market are now seldom heard from and spot coal for inland distribution is only to be had on reasonable notice. There are no auction sales just now. Most of the all-rail shippers are behind on orders, but consumers have learned to be forehanded and to provide storage more liberally than used to be the case.

Water Freights are hardening from all the ports; 70c. has been paid from Hampton Roads to Providence and 80c. to Boston, both on fair-sized tonnage, while 45c. continues the rate on barges for Long Island Sound, for New York loading.

Anthracite—A slight easing up is noticed, but dealers in New England are still after shipments. The retail demand has been the best in years and it has enabled the dealers to take on rather more coal than ordinarily. Individual shippers are doing little in this market, but the few companies that are serving the trade are sending coal around with almost clock-like regularity. Stove is still the size hardest to get, although broken is not far behind.

Current wholesale prices on bituminous are about as follows:

	Clearfields	Cambrias	Georges Creek	Pocahontas New River
Mines*	\$1.05@1.40	\$1.30@1.60	\$1.67@1.77	
Philadelphia*	2.30@2.70	2.55@2.85	2.92@3.02	
New York*	2.60@3.00	2.85@3.20	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*			\$2.85 firm	
Providence*				3.73@3.78
Boston*				3.83@3.95

*F.o.b. †On cars.

PITTSBURGH, PENN.

Bituminous—Coal mining continues active but the market is relatively quiet as buyers are well taken care of by existing contracts. Free coal usually brings a premium, though not always. The labor supply is not altogether adequate, but does not curtail production materially. The car supply, while not ample, is sufficient to take the coal which can be produced, though in spots shortages develop. Shipments in the lake trade are practically at record rate for this stage in the season and the prediction continues to be made that the season will show a new record by a comfortable margin. Slack continues in heavy supply in consequence of the lake movement and frequently sells down to 60c., though some large operators refuse to shade the 90c. price. Noting that prompt lots outside of slack frequently bring premiums of 5@10c. a ton, we quote regular prices as follows: Slack, 90c.; nut and slack, \$1.05; nut, \$1.25; mine-run, \$1.30; ¾-in., \$1.40; 1 ¼-in. steam, \$1.50; 1 ¼-in. domestic, \$1.55, per ton at mine, Pittsburgh district.

Connellsville Coke—Prices continue to be well maintained despite light inquiry. There is a small turnover of prompt furnace, generally at \$2.15 or \$2.20, while the nominal asking price is \$2.25. It is to be noted that sales have been made at the lower figure by operators who are committed to the \$2.25 figure. Furnaces have not yet arrived at the point of being willing to pay prices asked on second half contracts, but their apathy is in large part due to the stagnant pig-iron market. It is becoming understood that the operators who have been naming \$2.50 as their price for second half would be willing to close at a concession of 10 or 15c., depending on the desirability of the contract. We quote: Prompt furnace, \$2.15@2.25; contract furnace, \$2.35@2.50; prompt foundry, \$2.85@3.25; contract foundry, \$3@3.25, per ton at ovens.

NEW YORK

Bituminous—The soft-coal market has shown a tendency to ease off slightly in this section during the past week. The indications are, however, that the condition is only temporary and the unusual strength noticed in the report last week still exists, although not so clearly evident at this writing.

Mines are working about the same as last month, and the production is heavy. The growing scarcity of labor is developing to such proportions that operators are becoming seriously alarmed over the outlook. Concessions of many kinds are being offered in order to attract the men to the mining regions, but in spite of this fact operations are being seriously crippled, especially in the more undesirable districts. With production thus restricted the car supply has been sufficient, but predictions are being freely made that the situation in this respect will be quite serious the coming fall. It is a well known fact, however, that the roads are providing a great deal of additional equipment, so that it is probable they will be able to handle the situation better than is anticipated.

We continue last week's quotations on the following basis: West Virginia steam, \$2.55@2.60; fair grades Pennsylvania, \$2.65@2.70; good grades of Pennsylvanias, \$2.75@2.80; best Miller, Pennsylvania, \$3.05@3.15; Georges Creek, \$3.25@3.30.

Anthracite—While there is not a great deal of snap to the local market, the trade continues moderately active and about normal for this season of the year. The demand for the prepared sizes, particularly egg and stove, is excellent; most of this is, of course, for stocking purposes, although there has probably been more than the usual consumption lately due to the rather cold weather for this period of the year. Buckwheat and barley are quite heavy and some of these grades are now going into storage.

While the hard-coal market as a whole will probably touch a still lower level in midsummer, there is a strong healthy undertone and indications point to a heavy business the coming fall. The anthracite companies are being supplied with plenty of equipment, the mines as a rule are working good, and the production is about normal.

We quote the New York hard-coal market on the following basis:

	Circular	Individual	Seranton
Broken	\$4.70	\$4.45@4.65	\$4.50@4.70
Egg	4.95	4.90	4.95
Stove	4.95	4.90	4.95
Chestnut	5.15	5.15	5.20
Pea	3.50	3.30@3.45	3.35@3.50
Buckwheat	2.75	2.15@2.45	2.50@2.75
Rice	2.25	1.70@1.95	2.25
Barley	1.75	1.35@1.70	1.60@1.75

PHILADELPHIA, PENN.

Just at the present time, the coal trade in this vicinity, particularly in the local market, is not as favorable as both the retailer and wholesaler would like to see it. While it is understood that the companies are taking care of their output of the prepared sizes, there is a tendency to drag in almost all grades. This is particularly true of the local market, where even the demand for stove coal, which has been the leader for months, has fallen off, but this has given the operators an opportunity to furnish this size on calls in other directions. The reports of business at tidewater, however, still continue favorable, large quantities of coal going by barge to the down East points, where the demand is said to be strong.

There is, however, an unmistakable lack of snap to the market, and until after the middle of the month, not much improvement is looked for; but the approach of the first of next month, which marks a further advance of 10c. per ton, is always characterised by a spurt. Operations at all the mines are still good, and large quantities of coal are being sent to market; while it is not expected that it will be necessary to curtail production during the month of June, some of the pessimistically inclined hint at a possible intermittent suspension of mining during the next two months.

The bituminous trade is gradually rounding into shape, but the improvement is so slight that it takes an optimistic operator to indicate what it amounts to. Prices appear the same as last reported, with some few variations.

BALTIMORE, MD.

The feature of the local market during the past week was the heavy tonnage handled over the railroad piers. The Curtis Bay piers of the B. & O. R.R. were particularly active, one company alone having contracts for 66,000 tons of export and coastwise coal to be shipped at this point. The business showed a marked increase over previous weeks and promises to continue so for the next two weeks, a number of vessels being due here within that time, which will be loaded at both the Curtis Bay piers and the Port Covington piers of the Western Maryland R. R.

General market conditions continue good, with prices firm, especially on the low grades, which are selling freely at from 80@90c. Quemahoning and Georges Creek are, of course, in active demand. Some companies are reported to have insufficient production to meet their contract obligations and are being forced into the prompt market; the trouble is due to the inadequate supply of miners in the mining district.

The spot line business is exceptionally strong, with consumers insisting on prompt delivery. This would seem to indicate that buyers are stocking up at present prices rather than taking chances on the possibility of a restricted output in the future. The depression reported in other lines of industrial activity has not reached the coal trade in this vicinity as yet and operators continue to take an optimistic view of the outlook.

Export business for May was slightly below that of April,

but still of sufficient proportion to show a substantial increase in this branch. The total exports for May were 88,138 tons, or a reduction of 2492 tons over that for April. Of this amount, 25,417 tons were shipped to Egypt; Brazil, Mexico and Cuba, being the other main points.

BUFFALO, N. Y.

The interest of the coal dealers and consumers is just now centered more on the threatened strike of the teamsters than on the price of coal. It is noted that there are a great many buildings in the city, with elevators and sometimes other machinery to run, that seldom have more than two days' supply ahead so the problem may be a serious one.

Otherwise the situation is without much change. The complaint of car shortage in the bituminous trade is increasing, especially where cars are to be hurried to a consignee who is about out of coal; it is usually then discovered that passing and junction points are badly congested. One shipper states that it takes from a week to ten days to make sure of a car consigned from the Alleghany Valley mines, a matter of 150 miles or so, to Black Rock, for which the East Buffalo yard probably is more or less to blame.

As a rule the members of the bituminous trade are not forgetting the long years of selling coal at cost and the consumer was not then interested in helping them out. It is felt now that coal is bringing a paying price, not on account of any corner or stress that the consumer is obliged to stand for, but because business is good and the consumer can well afford to pay a good price for his coal.

There is a growing scarcity of cars as well as miners, which makes it certain that there is no coal waiting on track to be picked up. If the jobber has no mine connection he is finding it difficult to get much coal of any sort. The bituminous trade is feeling much more confident of the future than ever before.

Quotations, therefore, are strong at \$2.80 for Pittsburgh lump, \$2.65 for three-quarter, \$2.55 for mine-run and \$2.15 for slack, with Alleghany Valley about 25c. lower, chiefly on account of freight rate, the reduction being partly divided with the consumer. Coke is unchanged and not especially strong at \$4.75 for best Connellsville foundry.

There is an increasing complaint from the Allegheny Valley mines about the lack of both miners and cars. With such a large amount of coal sold on contract the situation is anything but pleasant, though it may be fully as satisfactory as when it was sold at cost. Nobody claims now that there is no profit in the business.

The anthracite situation is without feature and no stir is expected until fall except a little at the end of each month, when consumers show an interest over the saving of 10c. a ton. Shipments of anthracite from this port for the week amounted to 135,000 tons, a fairly good average. Most of the coal went to Chicago, as return cargoes from Lake Superior are not plenty.

COLUMBUS, OHIO

The chief feature of the local market is the continued strength although some weakness has developed in the small sizes. On the whole the trade is firm and prices are well maintained. No important weakness has developed and every branch of the business is on a sound basis. Prospects for the future are generally considered favorable.

The lake business is still one of the strong points of the trade. Thousands of tons are moving from Ohio mines to the Northwest, via the lakes, and since the demand from that section is strong it is freely predicted that the present season will be one of the largest in the history of the lakes. Chartering of boats is still going on and the movement of vessels is good since the early congestion at the upper lake ports is over.

Production has been somewhat restricted by an increasing car shortage. In the eastern Ohio district where cars are the scarcest the output is estimated at 70 per cent. of normal and the Pomeroy Bend district shows up with about 60 per cent. of the average. In the Hocking Valley there has been less trouble on this account and the output is close to normal. In the domestic fields there is a slight increase in the output.

Domestic trade shows some activity, although it is yet too early for much movement. Retailers are gradually accumulating supplies so as to be prepared for the stocking season when it comes. Some of the larger domestic users are already laying in their winter supply. On the whole there is bright prospects for an active domestic trade in all parts of Ohio and adjoining states.

The steam business is rather active along all lines although some factories are not buying as well as formerly. Iron and steel concerns are buying as usual. Railroads are also using quite a good deal of fuel. The freight movement is gradually increasing since the flood damage has been repaired. Some few steam contracts have not been renewed

although most of them have been closed up for the year. Most of the railroad contracts have also been signed.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump.....	\$1.50		\$1.50	\$1.50
2 ineh.....	1.35	\$1.25	1.35	1.30
Nut.....	1.20		1.25	
Mine-run.....	1.15	1.10	1.15	1.10
Nut, pea and slack.....	0.70		0.70	0.65
Coarse slack.....	0.60	0.65	0.60	0.55

HAMPTON ROADS, VA.

Dumpings at Hampton Roads piers have not been as heavy as expected. Some large foreign shipments have been made during the week but coastwise business has not been brisk. There is still a shortage of coal at all piers and some suppliers are finding it difficult to take care of contract business. Producers having free coal have been able to dispose of it at \$2.90 but even at this price there have been only one or two small sales as no one has had a large surplus at tidewater. There has been some inquiry for spot high volatile coal and no sales as suppliers are practically cleaned out of this grade.

While it was expected that the Norfolk & Western Ry. at Lamberts Point would lead in the tidewater dumpings for May yet it was hardly anticipated that they would reach over 350,000 tons. The actual dumpings, however amounted to 490,917 tons. The Chesapeake & Ohio Ry. at Newport News dumped during the month 289,990 tons and the Virginian Ry. over the one pier at Sewalls Point dumped 281,537 tons. The total dumpings for Hampton Roads for May amounted to 1,062,444 tons. The dumpings at Sewalls Point broke all previous records of that pier.

BIRMINGHAM, ALA.

The most satisfactory market locally is that on foundry and furnace coke; the usual summer weakness has not yet made its appearance, although the pig-iron market has been steadily declining for several months. The demand seems to easily absorb all coke offered by ovens which do a merchant coke business. The companies operating the furnaces make most of the coke and use same at their own smelters.

Anything that we might say regarding the coal market as a whole would be practically a repetition of last several reports. There is no price cutting worthy of serious mention, but the situation might be changed very quickly for the worse if all mines were supplied with plenty of cars and a little more labor. Unless the production is increased it is not believed that prices will reach as low a level as during former summers.

LOUISVILLE, KY.

The situation locally has not materially changed from last week, with the exception that the steam coals are slightly weaker and notably over-supplied. This is due to a heavy demand for domestic grades resulting in an excessive production of the smaller sizes; there has also been an easing off in the demand for these, due to a curtailment of industrial activity. In addition to this, railroads are taking rather more than the usual amount of the larger sizes which has further over-stocked the smaller grades. Several operators have found themselves with more of these sizes than they could dispose of, but it is believed that the demand will shortly catch up.

Domestic sizes of the better grades are in heavy demand in eastern Kentucky at \$1.65@1.70, with the off qualities at about \$1.50. No. 2 mine-run is selling at 90c.@\$1, and 3-in. steam at 85c. The better grades of nut and slack are quoted at 70@80c. with the second quality in rather light demand at 40@60c., this latter price also prevailing on western Kentucky nut and slack. Pea and slack are weak at 30c. f.o.b. mines.

INDIANAPOLIS

Retailers of this city report a good market, the June movement of coal promising to equal or excel that of May. This buying is practically all of Eastern coals, those who burn anthracite being particularly anxious to get their winter's supply before the usual advances in price. Last winter consumers had trouble in getting anthracite, even at the highest prices on record in this market. This experience is hurrying up their orders and few will take the risk of waiting until fall to lay in their supply.

The mines of the state show little change in the extent of their operations, three to four days a week being the rule. Some operators report an improved movement to the larger industries of the state that carry a large quantity of coal in storage.

Indiana mines continue to put in half time or slightly better. Reports reach here of a slackening in industrial ac-

tivity in the East, which is probably reflected to the coal business, but while the tariff may be causing some uncertainty and hesitation in the West, the wheels are kept going although factory owners have a keen eye out for any new developments. While the larger steam consumers are renewing contracts, the smaller ones seem willing to take the risks in the open market for their winter needs.

The movement of domestic from retailers' yards is fairly well divided between anthracite and the harder bituminous coals. Of the latter Pocahontas has the heaviest call, followed probably by Kanawha, Luhrig, Raymond City and Ohio Jackson in the order named.

The local wholesale market is about as follows:

No. 4 mine-run.....	\$1.10@1.20	Domestic 4- and 5-in.....	\$1.50@1.60
Nos. 5 and 6.....	1.05@1.10	Screenings No. 4.....	0.90@1.00
Steam lump, 1½-in.....	1.15@1.35	Screenings 5 and 6.....	0.80@0.90
Nut and egg.....	1.20@1.55	Brazil block.....	2.00@2.10
Domestic 3-in.....	1.40@1.65		

DETROIT, MICH.

Bituminous—Contrary to expectations, the soft-coal trade continues to improve, and prices are becoming stiffer generally all along the line. It is now clear that if lower prices are to appear, it will not be very soon. As a matter of fact consumers who have neglected to cover their requirements will now probably have to pay substantially higher prices. Contract business is becoming decidedly better, some operators claiming that they have all the tonnage, available for this purpose, now covered.

It is doubtful if local contract prices have ever before been as stiff as they are today, and it would only take a light buying movement to precipitate a runaway market. The only easy branch is the spot market, which is slightly softer than last week. There has been considerable slack offered in the open market, but the smaller grades as a whole have not suffered materially, and, while they will probably weaken toward midsummer, there is no reason for discouragement.

The feature of the market at the present time is the high price level on the better grades of spot coal; these have stiffened to such a degree that prompt shipment can only be had at from 5@10c. below contract figures for the year. There is a feeling that what little coal yet remains in the spot market will be commanding higher figures than contract tonnages. The market in general is regarded as exceptionally strong for this period of the year.

Prices have shown little change during the week, and the market is now quotable on the following basis:

	W. Va.	Hock-	Cam-	No. 8	Poca-	Jackson
	Splint	Gas	ing	bridge	hontas	Hill
Domestic lump.	\$1.50		\$1.50		\$1.90	\$1.90
Egg.....	1.50		1.50		1.90	1.90
1½-in. lump.....	1.25					
2-in. lump.....	1.15	\$1.15	1.15	\$1.15	\$1.15	
Mine-run.....	1.05	1.05	1.05	1.05	1.25	
Slack.....	0.80	0.85	0.40	0.85	0.80	1.10

Anthracite—Operators of all kinds are holding firm on prices, but it is generally conceded that the outlook from now on until the fall trade opens up is rather dull, to say the least. Wholesalers are already complaining that there is a falling off in demand, although not of sufficient magnitude to restrict shipments. Supplies are coming forward as rapidly as required and no delay is experienced in satisfying the demand.

Coke—The market on this product is brisk, Connellsville, being quoted at \$3, Semet Solvay, \$3.10 with gas house at \$2.85, all f.o.b. ovens.

MINNEAPOLIS—ST. PAUL

While it is a fact that most Illinois coals have been sold at a low price during the past month, there is a general expectation of a rise during the next two weeks and a steadiness which will prevail during the summer and fall. Eastern coals were never held on as firm a basis as they have been this year, and an actual scarcity of these exists which, with the strained labor conditions, fully warrants a maintenance of price. The amount of coal coming to the head of the Lakes was heavy during May, but the height of the ore carrying season is on and if coal is not available at Eastern loading ports, vessels will come up empty instead of waiting for cargoes.

CHICAGO

Owing to a shortage of Eastern coal, increases are evident in contract prices. During the week lump, egg and nut has sold for \$1.25 on the spot market. Recently buyers who have been depending for their supply upon the western Pennsylvania, Kanawha and Hocking Valley fields, found these to be practically exhausted and have turned to the Western districts for their supply, with particular attention given to the Franklin County field.

Both the contract and spot market has been strengthened as a result of this western inquiry. The coke market has been just about holding its own. Signs of activity are beginning to show in the anthracite trade, indicating that June trade will make up somewhat for the latter part of April and the first week of May.

Prevailing prices are:

	Springfield Franklin Co.	Clinton	W. Va.
Domestic lump	\$1.97@2.07	\$2.30@2.40	\$2.27
Egg	2.30@2.40		
Steam lump	\$1.82@1.87	2.07	3.85
Mine-run	1.77@1.82	2.20@2.30	1.97
Screenings	1.62@1.67	1.95	1.57@1.62

Coke—Connellsville and Wise County, \$5.25@5.50; byproduct egg and stove, \$4.75; byproduct nut, \$4.55@4.75; gas house, \$4.65@4.75.

ST. LOUIS, MO.

There is an indication that prices will get better; as a matter of fact, things are picking up a little bit now in the Carterville field. However, the reverse can be said of the Standard field, for 6-in. lump has finally got down to a basis of 80c. with mine-run at about 72½c. and 2-in. lump at 77½c. Anthracite is moving remarkably well right now, and coke is coming forward rather plentifully, while smokeless is in a somewhat doubtful position.

There is every indication that business is going to be remarkably good in July, and that will also affect market conditions the latter part of the present month. Some large contracts are open at the present time, and the prices asked in many instances indicate that the operators are at last realizing that they should take advantage of the coming season to make up what they have lost in the past.

The circular has shown little change in the past few weeks, and at the present time is:

	Carterville and Franklin Co.	Big Muddy	Mt. Olive	Standard
2-in. lump				\$0.80@0.85
3-in. lump			\$1.20	
6-in. lump	\$1.15 @ 1.25		1.25	0.85@0.90
Lump and egg		\$2.00	1.20	
No. 1 nut	1.10 @ 1.20			
Screenings	0.80 @ 0.85			0.75@0.80
Mine-run	1.00 @ 1.10			0.75@0.80
No. 1 washed nut	1.40			
No. 2 washed nut	1.25			
No. 3 washed nut	1.25			
No. 4 washed nut	1.20			
No. 5 washed nut	1.05			

PORTLAND, ORE.

It is reported that the railroads in the Pacific Northwest are figuring on abandoning oil fuel and returning to coal, but no confirmation to that effect has been obtainable here as yet. The first report was to the effect that the Great Northern which is using oil fuel between Everett, Wash., and Spokane, is planning to make the change and it is also reported that many large buildings in the Pacific Northwest will install coal burners shortly. A prominent railroad operator, here, however, states that he does not take much stock in the report that the Great Northern is planning to fall back on coal after having used oil with success, instead it is possible that oil will be used farther east than Spokane, over the Rocky Mountain division. Coal men on the other hand assert that the demand for crude oil for refining is so heavy that the big oil companies find it to their advantage to refine the oil rather than dispose of it in its crude state.

PRODUCTION AND TRANSPORTATION STATISTICS

ANTHRACITE SHIPMENTS

The following is comparative statement of the anthracite shipments for May and the first five months, of the years 1912-13, in long tons:

	May		5 Months			
	1913	1912	1913	%	1912	%
Phila. & Reading	1,123,860	201,575	5,703,277	19.75	4,094,665	20.57
Lehigh Valley	1,191,632	202,747	5,408,310	18.72	3,536,978	17.77
Cent. R.R. N.J.	745,347	128,099	3,724,219	12.89	2,521,302	12.67
Del. Lack. & West	882,661	277,140	3,961,646	13.72	2,881,219	14.47
Del. & Hudson	591,499	184,598	2,936,187	10.17	1,902,881	9.56
Pennsylvania	574,468	145,702	2,656,765	9.20	1,799,217	9.04
Erie	671,972	235,986	3,417,900	11.83	2,458,634	12.35
Ont. & Western	214,304	53,510	1,073,503	3.72	710,437	3.57
Total	5,995,742	1,429,357	28,881,807	.....	19,905,333	.....

Stocks at Tidewater at the close of May were 502,626 tons as compared with 546,243 the month before.

COAL AGE

THE CAR SITUATION

American Ry. Association reports surpluses and shortages of coal equipment for two weeks ended May 31, as follows:

	Surplus	Shortage	Net*
New England Lines	0	95	95
N. Y.; New Jersey, Del.; Maryland; Eastern Penn.	1,444	1,018	426
Ohio; Indiana; Michigan; Western Pennsylvania	1,538	109	1,429
West Virginia, Virginia, North & South Carolina	969	1,464	495
Kentucky, Tenn.; Miss.; Alabama, Georgia, Florida	318	249	69
Iowa, Illinois, Wis., Minn.; North & South Dakota	2,100	35	2,065
Montana, Wyoming, Nebraska	400	0	400
Kansas, Colorado, Missouri, Arkansas, Oklahoma	2,265	65	2,200
Texas, Louisiana, New Mexico	401	0	401
Oregon, Idaho, California, Arizona	1,991	16	1,975
Canadian Lines	175	58	117
Totals	11,601	3,109	8,492
Greatest surplus in 1912 (Apr. 25)	94,692	2,144	92,548
Greatest shortage in 1912 (Oct. 10)	6,491	14,897	8,406

■*Bold face type indicate a surplus.

SOUTHWESTERN TONNAGE

The following is a comparative statement of the southwestern tonnage for March and the first three months, 1912 and 1913:

State	March		Three Months	
	1912	1913	1912	1913
Missouri	365,314	276,779	952,526	843,190
Kansas	533,217	466,709	1,625,266	1,404,727
Arkansas	187,014	137,901	618,890	451,437
Oklahoma	311,492	245,449	928,205	909,312
Totals	1,450,037	1,126,838	4,124,887	3,608,666

FOREIGN MARKETS

GREAT BRITAIN

May 30—Best Admiralty coals are still scarce, but other qualities are more plentiful.

Quotations are approximately as follows:

Best Welsh steam	\$5.28@5.40	Best Monmouthshires	\$4.68@4.80
Best seconds	5.04@5.16	Seconds	4.56@4.62
Seconds	4.80@4.92	Best Cardiff smalls	3.24@3.36
Best dry coals	5.04@5.16	Seconds	3.12@3.24

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry while those for Monmouthshire descriptions are f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days—less 2½%.

SPANISH IMPORTS

Spanish imports of coal for the first three months of the current year were 640,958 tons as compared 614,593 for the same period last year. Coke imports for the same periods were 81,397 tons and 108,669 tons respectively.

COAL SECURITIES

The following table gives the range of various active coal securities and dividends paid during the week ending June 7:

Stocks	Week's Range			Year's Range	
	High	Low	Last	High	Low
American Coal Products	87	87	87	87	87
American Coal Products Pref.	109 $\frac{1}{4}$	109$\frac{1}{4}$	109$\frac{1}{4}$	109$\frac{1}{4}$	109$\frac{1}{4}$
Colorado Fuel & Iron	30	25	27	41 $\frac{1}{2}$	25
Colorado Fuel & Iron Pref.				155	150
Consolidation Coal of Maryland	102$\frac{1}{4}$	102$\frac{1}{4}$	102$\frac{1}{4}$	102$\frac{1}{4}$	102 $\frac{1}{4}$
Lehigh Valley Coal Sales	200	180	190		
Island Creek Coal Com.	52	51	51		
Island Creek Coal Pref.	85	84	84		
Pittsburgh Coal	17 $\frac{1}{2}$	15	16	24 $\frac{1}{2}$	15
Pittsburgh Coal Pref.	80	74	75 $\frac{1}{2}$	95	74
Pond Creek	22	19 $\frac{1}{2}$	19 $\frac{1}{2}$	23 $\frac{1}{2}$	19 $\frac{1}{2}$
Reading	159 $\frac{1}{2}$	154 $\frac{1}{2}$	156 $\frac{1}{2}$	168 $\frac{1}{2}$	152 $\frac{1}{2}$
Reading 1st Pref.	88	88	88 $\frac{1}{2}$	92 $\frac{1}{2}$	88
Reading 2nd Pref.	88	85	86	95	85
Virginia Iron, Coal & Coke	39	38	38	54	38
Bonds	Closing	Week's Range	Year's Range		
Colo. F. & I. gen. s.f.g. 5s	93	97	97	May '13	95 99 $\frac{1}{2}$
Colo. F. & I. gen. 6s				107 $\frac{1}{2}$	102 $\frac{1}{2}$
Col. Ind. 1st & coll. 5s. gu	78 $\frac{1}{2}$	Sale	78 $\frac{1}{2}$	78 $\frac{1}{2}$	78 $\frac{1}{2}$
Cons. Ind. Coal Me. 1st 6s				85	85
Cons. Ind. Coal Me. 1st 6s				Oct. '12	..
Gr. Riv. Coal & C. 1st g 6s	94	93	93	April '06	..
K. & H. C. C. 1st s f 5s	96	98	98	Jan. '13	98
Pocah. Con. Coll. 1st s f 5s	88	86	86	86	87 $\frac{1}{2}$
St. L. Rky. Mt. & Pac. 1st 5s	78	76	76	Mar. '13	76
Tenn. Coal gen. 5s	100	100	100	May '13	100
Birm. Div. 1st consol. 6s	100 $\frac{1}{2}$	103 $\frac{1}{2}$	101	April '13	101
Tenn. Div. 1st g 6s	102	102	102	Feb. '13	102
Cah. C. M. Co. 1st g 6s	104	110	110	Jan. '09	..
Utah Fuel 1st g 5s	80	80	80	May '13	79 $\frac{1}{2}$ 80
Victor Fuel 1st s f 5s	92	93	93	93	93
Va. I. Coal & Coke 1st g 5s	92	93	93	93	98

No Important Dividends were announced during the week.

PRICES OF MINING SUPPLIES

THE MARKETS IN GENERAL

Business is a great deal better than most of the reports emanating from New York would lead the readers to think. It is true that there is a tightness of money in New York, considerable unrest and a diminution of business in a financial way. Moreover, it is equally certain that some of the large corporations are unable to get the funds they desire at attractive rates of interest. If these companies are not able to secure a reasonable return as a result of the improvements they contemplate making, they will certainly be unwilling to pay any interest. There is no law compelling them to build fine stations or double-track their roads. They have been able to live without this and they will probably continue so for some time, and while the plea for higher freight rates is illegitimate, or at least is so considered, they will probably secure it. The great trouble is that a financial upheaval in Europe has had a serious effect in New York, through draining from New York a large supply of gold which might be used as a substantial basis for business in this country. It is probable, however, that by fall there will be some let up in the demand from Europe and by that time money will be available for the much needed crop movement in this country.

Price changes have tended toward lower levels in almost every instance, and the iron and steel markets are \$1 to \$2 per ton lower than a month ago, but it is significant to note that the leading interest is operating its steel production to more than 90% of capacity and in the month of May more pig iron was made in the United States than ever before in history.

The cement trade is active and prices are firm.

The tariff bill has not yet been settled and its delay in the Senate is undoubtedly having an influence on business.

Precipitated liquidation of securities in New York and foreign financial centers about the middle of June had an important effect on new construction. Until this selling runs its course and the markets of the world are able to save new capital, new construction work will be less active with a consequent reduction in the demand for supplies. This should make for lower quotations in the material markets. Contrary to the belief expressed in certain quarters the financial troubles were incident to, and not caused by, the "Rate Decision" handed down, June 9, by the U. S. Supreme Court.

LABOR

Unrest has been more widespread this month than before in several years. The number of strikes in all parts of the country is unusually large, but most of them have occurred among unskilled workers and, for the most part, those laborers securing less than \$12 a week. Fair-minded men believe that such laborers should have a just compensation and in many instances these strikes have been settled, the laborers securing a substantial increase. The strike of greatest importance among the skilled trades was the machinists in Baltimore, asking for higher wages and shorter hours, while the same is true in Buffalo. This, of course, has had its inception from the tremendous business automobile manufacturers have been doing, and they are still scouring the country for capable machinists.

Coal miners are in exceptionally good demand and the supply seems to be short. Immigration coming to these shores is large, the total steerage passengers arriving during the first ten months of the year numbering 750,000, while the arrivals at the port of New York alone in May there were approximately 100,000 immigrants.

IRON AND STEEL PRODUCTS

New business in April did not develop large and in fact it was a general disappointment to all classes of manufacturers. There had been a boom for a year which was expected to continue indefinitely. New orders were few and very far between and salesmen were unwilling to make quotations while consumers seemingly had no interest in the market. On the other side, it is worthy of note that the U. S. Steel Corporation were operating their finished-steel mills to 92% of capacity, while the ingot production was 99% of production, and other steel companies are working in like ratio. It is true that the unfilled orders for steel products have been rapidly declining, but on the other hand there is little suspicion that the steel mills of the country could not be kept

actively engaged for six months if no other orders should come in and there should be no postponements. It is also significant to note that a prominent street railway company in applying for certain franchises urged the commission to expedite its work as it would be impossible to secure equipment in less than six months after the orders were placed.

The automobile manufacturers of the country are working as never before, one company making a popular low-priced car, being 60,000 cars behind in its orders. This means that for nearly ten weeks this company will not be able to make prompt shipment even though no other orders come in.

Railways are not buying equipment with anything like the liberality of a year ago, but the New York Central recently ordered 175 locomotives.

Unfilled orders on the books of the United States Steel Corporation decreased 650,000 tons during the month of May.

Steel Rails—A marked decline in the demand for light rails was a distinct disappointment to the steel trade and a most unexpected one. It has been conceded for some time that the railways would probably curtail their orders for standard section, but it was not believed that light rails would be so inactive. The only order of importance during the month was for 10,000 tons for export.

Quotations continue unchanged at 1.25c. per lb. per standard section weighing from 50 to 100 lb. per yard; 1.21c. for 40- to 50-lb. rail; 1.30c. for 16- to 20-lb. rail. These quotations are for carload lots, f.o.b. Pittsburgh.

In Chicago, 16- to 20-lb. rails are 1.30c.; 12-lb., 1.35c.; 8-lb., 1.40c. Relaying rails, Chicago, are \$24 per gross tons and can be obtained at other points at approximately the same figure although not in any considerable quantities.

Track Supplies—Business is very inactive, although there was an enormous order for tie plates early in the month by the Lake Shore & Michigan Southern. Spikes are 2.10c. base for large lots; track bolts with square nuts, 2.40@2.50c. base, and tie plates, \$34@36 per net ton. These quotations are for Chicago delivery. In Pittsburgh angle bars are from 1.50@1.60c. and spikes 1.95@2.05c. All these quotations except the tie plates are per lb. and fairly good sized lots.

Pipe—The demand for pipe has not fallen off to the same degree as has been noted in other commodities and while some revision of discounts has been made the general pipe business continues active. The fuel companies are buying in large quantities and the pipe mills have all the business they can take care of for the present. They are, however, able to make fairly prompt shipment.

Discounts are as follows:

	Black	Galvanized
3/4- to 2-in. butt welded.....	79 1/2 %	70 %
2 1/2- to 6-in. lap welded.....	78 1/2 %	70 %

Based on these discounts, the net price of pipe per foot are as follows in carload lots f.o.b. Pittsburgh:

Size, inches	Black	Galvanized
3/4	2.35	3.40
1	3.50	3.40
1 1/4	4.75	6.60
1 1/2	5.55	8.00
2 1/2	12.60	17.50
3	16.50	23.10

Sheets—Much weakness has been manifested in the market and considerable price cutting is noticed, especially in the West. Some of the mills, which were securing premiums for prompt delivery three months ago, are now most actively engaged in cutting quotations. At the same time, the Steel Corporation is obliged to curtail operations to about 25% of capacity at the Vandergrift mills because of the lack of semi-finished steel. Shipments are fairly prompt and can easily be made eight weeks after specifications are received.

The following quotations are for lots of a few bundles f.o.b. Pittsburgh and Chicago. The price for large lots is unchanged at 2.30c. f.o.b. Pittsburgh for No. 28 black.

	Cents per Pound			
	Pittsburgh		Chicago	
	Black	Galv.	Black	Galv.
Nos. 22 and 24.....	2.75	3.55	2.70	3.50
Nos. 25 and 26.....	2.80	3.70	2.75	3.65
No. 27.....	2.85	3.95	2.80	3.90
No. 28.....	2.90	4.00	2.85	2.95

Structural Materials—Business is less active in the East and similar conditions prevail in the West, although there it is expected that considerable railroad business will develop within the next few months. The diminution in building, which is prevalent in the East, seems likely to continue for some time, and from the present outlook, when railways are obliged to pay such high rates of interest on capital, it is doubtful if they can secure the funds with which to make their improvements. Under such circumstances an early return to a large volume of business in fabricated materials is unlikely.

Quotations are without change, except the premium for prompt shipment has disappeared. Plates, beams and angles are held at 1.50c. base from Pittsburgh, and in Chicago 1.68@1.73c. All of these prices are per 100 lb. in carload lots.

WIRE PRODUCTS

New orders are coming in slowly and there is far less demand for wire products in the farming community than was expected early in the year. The mills are not rushed with orders and are able to make shipments fairly prompt. Quotations are as follows for large lots: Painted barbed wire, \$1.86; galvanized, \$2.20; annealed fence wire, \$1.60; galvanized, \$2.05. In Chicago annealed fence wire is \$1.78 and galvanized \$2.18. Barbed-wire fencing in the Chicago market is \$2 and galvanized \$2.40. All of these quotations are per 100 lb. For smaller lots bought from jobbers' store in these centers advances will be about 25c. per 100 lb.

Wire Rope—The demand is steady and prices are unchanged. Two-inch rope in Pittsburgh is held at 50c. per lin.ft.; 1 1/4-in., 23c.; 3/4-in., 10c. These quotations are for the highest grade, but cheaper grades can be had at considerable concessions from these figures.

Copper Wire—Business is not especially active, but several of the important trunk lines of the country are making preparations to electrify portions of their system. This will call for an immense amount of copper and stimulate trade more than at any time since 1906. The base price of copper wire is unchanged at 17c. per lb.

Telegraph Wire—Business is fairly active with quotations unchanged as follows:

Prices are as follows in cents per pound for wire measured by the Birmingham wire gage: "Extra Best Best," Nos. 6 to 9, 4 1/4c.; Nos. 10 and 11, 4 1/2c.; No. 21, 4 1/4c.; No. 14, 5 1/4c.; "Best" Nos. 6 to 9, 3 1/2c.; Nos. 10 and 11, 3 1/2c.; No. 12, 3 1/2c.; No. 14, 4c. Actual freight is allowed from Trenton, N. J., where it does not exceed 25c. per 100 lb.

HARDWARE

Bar Iron and Steel—Prices are steady. Quotations from jobbers' stores in New York and Chicago are as follows:

	Per lb.
Refined iron:	
1 to 1 1/2 in., round and square.....	2.10c.
1 1/2 to 4 in. x 3/8 to 1 in.....	2.10c.
1 1/2 to 4 in. x 1/4 in. to 1/8 in.....	2.30c.
Norway bars.....	3.60c.
Soft steel:	
3/4 to 3 in., round and square.....	2.05c.
1 to 6 in. x 3/8 to 1 in.....	2.05c.
1 to 6 in. x 1/2 and 1/8 in.....	2.20c.
Rods—3/8 and 1/2 in.....	2.15c.
Bands—1 1/2 to 6 1/2 in. to No. 8.....	2.35c.
Beams and channels—3 to 15 in.....	2.15c.

Chain—There is less demand than a month ago. Ruling quotations per 100 lb., f.o.b. Pittsburgh, are as follows:

1/8 in.	\$7.50
1/4 in.	4.95
5/16 in.	3.95
3/8 in.	3.40
7/16 in.	3.20
1/2 and 5/8 in.	3.00
5/8 and 1 1/8 in.	2.90
3/4 and 1 1/4 in.	2.80
7/8 and 1 1/2 in.	2.70
1 to 1 1/4 in.	2.60

Extras for BB

1/8 in.	1.50
1/4 in.	1.50
and larger.....	1.25

Extras for triple B (BBB)

3/8 and 1/2 in.	2c.
1/2 and larger.....	1.75c.

Nails—In the East the demand is not as active as a month ago and some falling off in the West, although not in the same proportion as along the Atlantic Coast. Prices are steady, large lots being held at 1.80c. Pittsburgh and 2.10c. Chicago. For small lots from jobbers' store the price is 2c. in Pittsburgh and 2.30 in Chicago. Approximately the same figures may be obtained in important jobbing centers throughout the Middle West as in Chicago.

Rivets—The demand continues less active than a month ago and users seem to have a sufficient supply on hand to meet their needs. Quotations are \$2.20 for structural rivets and \$2.30 for boiler rivets. These prices are per keg of 100 lb.

METALS

Copper—Consumers abroad continue to buy copper in large quantities and exports for the first five months of this year established a new high record for the period. American consumers are likewise buying freely and the recently published statistics of the Copper Producers' Association show that the stocks of unsold copper were again reduced during the month of May. Prices have been shaded somewhat during the last few weeks, chiefly because of the financial situation, and electrolytic can now be had at 15 1/2@16c., while Lake copper can be had at 15 1/4@16 1/4c. These prices are for comparatively large lots.

Tin—The market continues steady, although slightly lower. Consumption abroad is large, but in the United States is falling off somewhat. The price is 47c. per lb.

Lead—The market is not as strong as a month ago, and quotations have been revised downward. In New York lead sells at 5.35c. and in St. Louis at 5.20c.

Solder—Strictly half and half solder can be had in New York at 20@27 1/2c.

MISCELLANEOUS

Castings, Gray-Iron—The foundries making a specialty of castings having low-carbon content and being used for general building work, are anxiously looking for business, and in consequence some very low prices have been named. Rough castings of large sizes can be had at 1.65@2.20c. per lb. Small castings can be had at 2.50@3c. per lb.

Portland Cement—A rather extended inquiry covering all parts of the country has been made from reports of managers of cement mills and while it is found that business is fairly satisfactory, in every part of the country except northern Indiana, Michigan and Kansas, none of the mills are especially well supplied with orders and they do not believe a serious shortage will result this year. It is thought that in some quarters a slight advance will possibly be made later in the year, but the shortage of freight cars in which to ship the cement is more likely to be an important factor than any other one thing. There have been no price changes and the following quotations are per bbl. in bulk at the mill, to which should be added 40@50c. per bbl. for the packing, giving the price f.o.b. mill; to this should be added the freight from the mill to destination. In Pittsburgh the price is 90c.@\$1; Chicago, \$1.05@1.10; Missouri district, \$1@1.05; Chattanooga, Tenn., \$1@1.05; Texas and Oklahoma, \$1.10@1.20. A few mills are quoting around \$1. In New York and Pittsburgh \$1.58 is quoted with an allowance of 40c. per bag returned.

Bars, Concrete Reinforcing—The demand is not as large as it was early in the spring, but still it is fairly satisfactory and there has been little price cutting. The following quotations are for small lots from warehouse stock:

PITTSBURGH PRICES IN CENTS PER POUND

	Warehouse Stock
3/8-in.	2.00@2.10
5/16-in.	2.05@2.15
1/2-in.	2.10@2.20
5/8-in.	2.25@2.35

Shafting—The largest consumer of shaft for automobile purposes entered an order for 4000 tons last month. This temporarily stiffened the market. Business continues active, and the discounts are unchanged at 58% from list for carload lots and 53% from list for less than carload lots. The following net prices per foot are based on the discount of 53%:

Diameter in inches	Cents per foot	Diameter in inches	Cents per foot
3/4	4.25	2 1/4	31.50
1 1/4	10.80	2 1/2	39.30
1 1/2	14.05	2 3/4	48.00
1 3/4	19.20	3	56.50
2	25.00	3 1/2	84.00

Triangular Mesh—Business is not especially active.

From mills in De Kalb, Ill., quotations are 18c. per 100 lb. higher than those quoted below, which are per 100 sq.ft. f.o.b. Pittsburgh. These are for lots of less than 10,000 sq.ft.

No. 4	\$1.23	No. 32	\$2.62
No. 23	2.05	No. 36	1.05
No. 26	1.42	No. 40	3.25
No. 28	1.97	No. 41	2.48

Brattice Cloth—The scarcity of material continues, and orders are in as large a volume as ever. No hope is held out that the situation, as far as lower prices are concerned, will improve during the summer.